

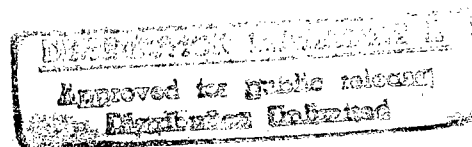
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# ***JPRS Report***

# **Science & Technology**

***Central Eurasia:  
Life Sciences***

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# Science & Technology

## Central Eurasia: Life Sciences

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26 March 1992

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**Molecular and Functional Features of Chromatium Minutissimum Reaction Centers**

927C0286A Moscow *BIOKHIMIYA in Russian* Vol 56 No 8, Aug 91 (manuscript received 05 Dec 90; in final form 20 Feb 91) pp 1466-1478

[Article by N. I. Zakharova, Ya. Sabo, S. K. Chamorovskiy, A. A. Kononenko and A. B. Rubin, Biological Faculty, Moscow State University]; UDC 577.355.2

[Abstract] Reaction centers (RCs) were isolated from ultrasonically disrupted *Chromatium minutissimum* cells by chromatography on hydroxyapatite columns, centrifugation and gel electrophoresis for structural and functional studies. The resultant protein component was resolved into five subunits (37, 34, 25, 19 and 17 KD),

with two subunits (19 and 37 KD) bearing heme moieties. Results of redox titration and absorption spectroscopy in the  $\alpha$ -band of cytochrome-c were consistent with the presence of six heme groups per RC. The midpoint potentials for four heme groups were calculated to be 390, 320, 210 and 100 mV. Incomplete heme reduction studies indicated that the midpoint potentials for the two other heme groups are in the -150 to 50 mV interval. The rate constants for photoinduced electron transport were on the same order of magnitude as those obtained with isolated chromatophores and intact *C. minutissimum* cells. Finally, dark-light differential spectroscopy led to identification of menaquinone as the primary electron acceptor in *C. minutissimum* RCs. Figures 8; references 52: 10 Russian, 42 Western.

### Altered Membrane Proteins and Lipopolysaccharides in Cadmium-Tolerant Pseudomonads

927C0208A Moscow BIOLOGICHESKIYE  
MEMBRANY in Russian Vol 8 No 8, Aug 91  
(manuscript received 03 Dec 90) pp 800-804

[Article by N. T. Alekseyeva, D. A. Anisimov, V. A. Khomenko, Ye. N. Kalmykova, I. A. Beleneva and L. S. Shevchenko, Pacific Institute of Bioorganic Chemistry, Far Eastern Scientific Center, USSR Academy of Sciences, Vladivostok]; UDC 579.841.11: 314.577.114.7: 577.112

[Abstract] Marine *Pseudomonas* sp. strain 40 was used in assessing protein and lipopolysaccharide (LPS) changes following selection on media containing 800 µg/ml of cadmium. Cadmium tolerance was retained during six month subculturing on cadmium-free media. There were no significant changes in the cytoplasmic membrane, except a slight increase in 29 KD stress proteins. More significant changes were observed in the case of outer membrane and periplasmic region proteins. In the murein (peptidoglycan)-unassociated category the following cadmium-inducible proteins were noted: Two new 97-116 KD proteins and two new 28 KD proteins. In addition, disappearance of 60 and 45 KD proteins and appearance of 66 and 35 KD protein was felt to represent either point mutations or expression of silent genes. Changes in the spectrum of murein-associated proteins included elimination of 15 and 45 KD proteins and appearance of a ca. 29 KD fraction, implicating alterations in the specificity of ion channels. LPS analysis revealed that change from wild type to cadmium tolerance was accompanied by a shift in the rhamnose:galactose:glucose:galactosamine ratio from 7:18:73:2 to 8:6:84:2. The latter may have a bearing on antigenicity, which remains to be investigated. Figures 2; references 15: 4 Russian, 11 Western.

### Intracellular Regulation of Ion Channels in Neural Membranes

927C0208B Moscow BIOLOGICHESKIYE  
MEMBRANY in Russian Vol 8 No 8, Aug 91  
(manuscript received 12 Mar 90) pp 789-799

[Article by Ye. I. Solntseva, Scientific Research Institute of the Brain, USSR Academy of Medical Sciences, Moscow]; UDC 577.352.465

[Abstract] A review of essentially Western literature is presented on intramembranous and cytoplasmic factors involved in regulation of ion channels in neuronal membranes. Major factors identified to date include membranous entities such as GTP-binding proteins, and a class of cytoplasmic components represented by second messengers: cAMP, cGMP, Ca<sup>2+</sup>, and phosphoinositide and arachidonic metabolites. The second messengers act via at least two major mechanisms of action. In some cases they are responsible for activation of specific protein

kinase cascades resulting in phosphorylation of channel-forming proteins mechanisms. This is the mechanism of action of cyclic nucleotides, Ca<sup>2+</sup>/diacylglycerol and Ca<sup>2+</sup>/calmodulin. In addition, patch clamp techniques have revealed that ion channel modulation may also occur by direct binding of second messengers to channel proteins. For each mechanism there are many variations making it difficult to ascertain the primary mechanism in any given situation, leaving the field wide open for further research. Figures 5; references 126: 16 Russian, 110 Western.

### Synaptic Membrane Microviscosity and Opioid Ligand Binding in Rat Brain

927C0208D Moscow BIOLOGICHESKIYE  
MEMBRANY in Russian Vol 8 No 8, Aug 91  
(manuscript received 29 Nov 90) pp 830-836

[Article by Ye. L. Maltseva\*, O. S. Belokoneva, S. V. Zaytsev and S. D. Varfolomeyev, Intefaculty Special Problems Scientific Research Laboratory of Molecular Biology and Bioorganic Chemistry, Moscow State University; \*Institute of Chemical Physics, USSR Academy of Sciences, Moscow]; UDC 577.352.335:577.354.9

[Abstract] ESR probes 5,6-benzo-2,2,4,4-tetramethyl-1,2,3,4-tetrahydro-γ-carbolin-3-oxyl (I) and 2,2,6,6-tetramethyl-4-carpyloxyloxy piperidine-1-oxyl (II) were used to assess the correlation between synaptosomal microviscosity and binding of radiolabeled naloxone to  $\nu$  receptors. Studies on membrane preparations derived from male Wistar rat brains from which the cerebellum had been removed involved incubation at 37°C with 10E-4M linolenic, arachidonic, or palmitic acid or the antioxidants ionol and phenoxane. In general, changes in viscosity with probe I were negligible; studies with probe II showed that the first four agents attenuated the rate of decrement in microviscosity, whereas phenoxane had a slightly enhancing effect. The plots for reduction in microviscosity with incubation time and reduction in naloxone binding were analogous, and a correlation coefficient of  $r = 0.93$  prevailed between receptor inactivation and loss of microviscosity. Consequently, the data provided additional confirmation for the hypothesis that loss of opioid binding is to a large extent dependent on increased microviscosity of the lipid component which facilitates "burial" of the receptors in the bilayer membrane. Figures 3; references 16: 12 Russian, 4 Western.

### Maintenance of Ion-Osmotic Homeostasis in Animal Cells With Blocked Ion Pumps: Importance of Permeable Intercellular Junctions

927C0208E Moscow BIOLOGICHESKIYE  
MEMBRANY in Russian Vol 8 No 8, Aug 91  
(manuscript received 13 Jul 90) pp 837-853

[Article by K. B. Aslanidi, L. Yu. Boytsova\*, T. A. Vinogradova\*\*, L. N. Kublik, V. P. Mokh\*\*\*, I. I. Makharova\*\*, T. V. Potapova\*, Ye. S. Trepakova and L.

M. Chaylakhyan, Institutes of Theoretical and Experimental Biophysics, Pushchino, Moscow Oblast, and of \*\*Cytology, Leningrad, USSR Academy of Sciences; \*Interfaculty Laboratory of Molecular Biology and Bioorganic Chemistry, Moscow State University; \*\*\*All-Union Cardiological Research Center, USSR Academy of Medical Sciences, Moscow]; UDC 577.3:576.5

[Abstract] The significance of permeable intercellular junctions in maintaining ion-osmotic homeostasis was assessed in mixed culture models using ouabain sensitive and insensitive cells. The experimental rationale was based on the fact that in some animal species ouabain inhibits  $\text{Na}^+$ ,  $\text{K}^+$ -ATPase, a major ion pump. Incubation of susceptible cells—human and canine fibroblasts—with one  $\mu\text{M}$  ouabain for two h at  $37^\circ\text{C}$  resulted in membrane depolarization, reduction of  $[\text{K}^+]_i$  and elevation of  $[\text{Na}^+]_i$ . The ion pump of the rodent cells (rat glioma, mouse and hamster fibroblasts) was not affected by ouabain and ion-osmotic homeostasis was maintained. Similarly, mixed cultures of human and rodent cells were refractory to the adverse effects of ouabain, depending on cell ratios and species. The most effective combination consisted of human and hamster fibroblasts and correlated with the most efficient formation of intercellular junctions providing pathways for ion fluxes. This phenomenon represents a form of energy coupling across intercellular barriers mediated by ion flows in which one cell supports another's ion/osmotic homeostasis. Figures 7; tables 3; references 63: 16 Russian, 47 Western.

#### Impact of Intracellular ATP on Voltage-Gated Rapid Potassium Currents in Neural Membranes of Mollusks

927C0208F Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 8 No 8, Aug 91 (manuscript received 30 Oct 90) pp 861-870

[Article by N. A. Lozovaya, Ye. A. Vulfius, V. I. Ilyin and I. V. Kraste, Institute of Cellular Biophysics, USSR Academy of Sciences, Pushchino, Moscow Oblast]; UDC 577.352.465

[Abstract] Voltage clamp conditions were utilized to assess the impact of intracellular ATP concentrations on ATP-sensitive outward  $\text{K}^+$  currents (A currents) in membrane patches isolated from the greater and lesser parietal ganglia of the pond snail (*Lymnaea stagnalis*). Supraphysiological ATP levels (2-10 mM) potentiated the magnitude of steady state  $\text{K}^+$  efflux, in effect inducing a shift in activation and inactivation parameters toward more depolarized potentials. Nonhydrolyzable analogues of ATP were ineffective. Effects of combined action of ATP and  $\text{Mg}^{++}$  was dependent on the  $\text{Mg}^{++}/\text{ATP}$  ratio. At a ratio of 1:1 the effects were essentially those seen with exogenous ATP alone, but at 5:1 the volt-ampere plots were shifted toward hyperpolarization. Studies with inhibitors that diminish intracellular ATP levels and glycolysis intermediates confirmed the impression that intracellular ATP concentration is the primary factor gating  $\text{K}^+$  channels, a

process requiring ATP hydrolysis. Figures 7; tables 1; references 26: 8 Russian, 18 Western.

#### Monolayers of Surface Active Derivatives of Nucleosides

927C0208G Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 8 No 8, Aug 91 (manuscript received 19 Nov 90) pp 885-891

[Article by S. Yu. Zaytsev, T. Kraukh and V. P. Zubov, Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Moscow]; UDC 577.352.2+577.113.3

[Abstract] A series of novel surfactants were synthesized for testing as possible biosensors sensitive to changes in surface phenomena. The four surfactants—(2',3'-isopropylidene-5'-stearyl)adenosine, (5',3'-distearyl-2'-deoxy) adenosine, (2',3',5'-tristearyl) adenosine and (5',3'-distearyl)-2'-deoxythymidine—were selected on the assumption that their optical characteristics would be sensitive to reactions with complementary nucleic bases and readily monitored by UV spectrophotometry. The results demonstrated that reaction of the mono- and multilayer surfactant films with 2,6-diaminopyridine in the aqueous subphase resulted in the superimposition of the UV spectra, thereby demonstrating their potential application as optical sensors. Figures 6; tables 1; references 6: 2 Russian, 4 Western.

#### Photochemical Cycle of 4-Keto-Retinal-Bearing Analogue of Bacteriorhodopsin

927C0209A Moscow BIOLOGICHESKIYE MEMBRANY in Russian Vol 8 No 5, May 91 (manuscript received 22 May 90) pp 460-467

[Article by L. S. Broun, A. B. Druzko\*, Ye. P. Lukashev and S. K. Chamorovskiy, Chair of Biophysics, Biological Faculty, Moscow State University; \*Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow oblast]; UDC 577.355.2

[Abstract] Impulse and low-temperature absorption spectroscopy was employed in an analysis of the photochemical transformations occurring in aqueous solutions of 4-keto-retinal bacteriorhodopsin (KRBR) in aqueous suspensions. The apoprotein component employed in the study was isolated from *Halobacterium halobium* purple membranes. The KRBR spectrum consisted of a broad absorption band with a maximum at ca. 508 nm. Under appropriate conditions of illumination, temperature, and pH the following photointermediates were identified: K-560, M-395, M-420, M-440, and at least two O-640-type intermediates. These observations led to the formulation of a putative photochemical transformation cycle for KRBR. Figures 7; references 16: 12 Russian, 4 Western.



### Structure-Activity Relationships of Exogenous Quinone in Reaction Centers of Rhodobacter Sphaeroides R-26

927C0209B Moscow BIOLOGICHESKIYE  
MEMBRANY in Russian Vol 8 No 5, May 91  
(manuscript received 09 Aug 90) pp 468-475

[Article by Ye. Yu. Kats, A. Ya. Shkuropatov, A. V. Klevanik, V. M. Adanin\* and V. A. Shuvalov, Institute of Soil Science and Photosynthesis and of \*Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino, Moscow Oblast]; UDC 577.355.4

[Abstract] Microsecond flash spectroscopy was used in assessing the efficiency of a series of N-alkyl- and N-arylaminonaphthoquinones in effecting photoinduced charge separation in reconstituted ubiquinone-depleted reaction centers isolated from Rhodobacter sphaeroides R-26. The essential findings were that efficiency was unrelated to the redox potential of the naphthoquinones, but rather dependent on the spatial orientation of the alkyl and aryl radicals. Computerized conformation analysis demonstrated that size was of secondary importance. Limitations of the aryl congeners in electron transport was due to their poor fit on the receptors. Consequently, while reaction center reconstructed with the alkyl derivatives exhibited efficiencies of 100 percent (based on restoration of  $\Delta A_{865}$  amplitude), the best efficiencies with the aryl congeners were ca. 30 percent. Figures 4; tables 2; references 17: 3 Russian, 14 Western.

### Influence of Light Intensity on Organization of Photosynthetic Apparatus of Rhodospseudomonas Palustris AB

927C0209C Moscow BIOLOGICHESKIYE  
MEMBRANY in Russian Vol 8 no 5, May 91  
(manuscript received 07 Sep 90) pp 476-482

[Article by I. R. Prokhorenko, Z. K. Makhneva and Yu. Ye. Yerokhin, Institute of Soil Science and Photosynthesis, USSR Academy of Sciences, Pushchino, Moscow Oblast]; UDC 517.112:577.355.3

[Abstract] Rhodospseudomonas palustris AB was grown under anaerobic conditions and either 300 or 30,000 lux radiant light to assess the impact of the latter parameter on the photosynthetic apparatus (PA). The underlying consideration was that the light harvesting complex B800-850 is affected by the intensity of radiant illumination during growth in the following manner. High intensity radiation induces formation of type I complexes which are characterized by a  $A_{850} > A_{800}$  shift, whereas with low intensity  $A_{800} > A_{850}$  type II complexes prevail. Studies with potassium ferrocyanide demonstrated that in type II lamellae bacteriochlorophyll B875 is the species most susceptible to oxidation, while in type II lamellae B850 is subject to destruction. Additional evidence for structural changes in the PA was indicated by preferential pronase E hydrolysis of polypeptides H, M and L in type II lamellae and  $\alpha$  and  $\beta$

polypeptides of the B875 complex in type I lamellae. These findings provide additional evidence for light intensity-induced alterations in the disposition of protein and pigment components in PAs. Figures 6; references 16: 1 Russian, 15 Western.

### Temperature Jump Studies on Electron Transport in Bacterial Reaction Centers With Multiheme Chromosome C

927C0209D Moscow BIOLOGICHESKIYE  
MEMBRANY in Russian Vol 8 no 5, May 91  
(manuscript received 02 Jul 90) pp 483-490

[Article by B. V. Zubov, A. A. Kononenko, S. K. Chamorovskiy and I. V. Chizhov, Institute of General Physics, USSR Academy of Sciences, Moscow; Biological Faculty, Moscow State University]; UDC 577.37

[Abstract] Thermal perturbations were employed in ongoing studies on heat-induced structural and functional transitions in chromatophores and reaction centers of Chromatium minutissimum, Ectothiorhodospira shaposhnikovii and Rhodobacter sphaeroides. Rapid temperature jumps were attained with laser flashes ( $\text{CO}_2$  laser emitting at  $10.6 \mu\text{m}$  or YAG-Re at  $2.94 \mu\text{m}$ ), with the thermodynamic and kinetic correlates of the perturbations in cytochrome c-bacteriopheophytin dimer assessed from changes in absorption spectra. The resultant evaluation of photocyclic phenomena correlated with thermodynamic ( $E_a = 16 \text{ kJ/M}$ ) and kinetic constants (ca. 10 msec) characteristics of conformational transitions in macromolecules. These observations demonstrated that thermally-induced conformational transitions promoting efficient electron transport between quinones are much faster than those facilitating electron transport from multiheme cytochrome subunits to bacteriochlorophyll. Figures 6; references 12: 7 Russian, 5 Western.

### Calmodulin/Calcium Enhancement of Acetylcholine-Induced Currents in Mollusk Neurons

927C0209E Moscow BIOLOGICHESKIYE  
MEMBRANY in Russian Vol 8 no 5, May 91  
(manuscript received 09 Nov 89) pp 522-527

[Article by V. A. Dyatlov, Institute of Physiology imeni A. A. Bogomolets, Ukrainian SSR Academy of Sciences, Kiev]; UDC 612.829:612.822

[Abstract] Electrophysiological studies were performed with neurons LP11, B1, B3 and F28 isolated from ganglia of the garden snail Helix pomatia in order to further define the interaction of Ca ions and cAMP in modulation of acetylcholine-induced Cl currents. In neurons LP11 and F28 Ca ions enhanced acetylcholine-induced Cl currents by 58-245 percent and in neurons B1 and B3 inhibited them by 12-18 percent. Additional

studies with protein kinase inhibitors and factors modulating intracellular cAMP (e.g., serotonin) demonstrated that cAMP counteracts the effects of Ca ions. Accordingly, the data indicated that the mechanism of action of Ca ions in this respect rested on the formation

of Ca-calmodulin complexes. Consequently, modulation of the Cl currents depends on activation of protein kinases and phosphorylation of acetylcholine receptor proteins. Figures 3; references 15: 8 Russian, 7 Western.

**Production of Human Monoclonal Antibodies  
Against Yersinia Pestis Antigens**

927C0206A Moscow BIOTEKHNOLOGIYA in Russian  
No 4, Jul-Aug 91 (manuscript received 05 Jan 90)  
pp 19-22

[Article by T. D. Yermolenko, O. B. Nikolenko and L. P. Alekseyeva, Rostov-on-Don State Scientific Research Antiplague Institute]; UDC 579.842.23:616-097:57.089.33

[Abstract] An assessment was performed of factors that may be used to enhance production of human monoclonal antibodies against *Y. pestis* EV76 antigens. The data showed that optimum culture conditions for human splenocytes and peripheral blood lymphocytes were provided by a fifty-fifty mixture of human and calf sera. The latter combination ensured ca. 70 percent viability on day three. Furthermore, in vitro immunization studies demonstrated that FIA capsular antigen and merthiolate-killed *Y. pestis* EV76 cells enhanced transformation and production of monoclonal antibodies by cells derived from vaccinated donors, but did not influence cells from unvaccinated donors. In addition, highest fusion rates with human and murine myelomes were observed with splenic cells stimulated in vitro and by peripheral blood lymphocytes from vaccinated subjects. However, the resultant hybridomas had low proliferative

potential and ceased antibody production in one to two months. Figures 1; tables 3; references 12: 2 Russian, 10 Western.

**Immobilization of Echis Venom on  
Aminosilochromes**

927C0206B Moscow BIOTEKHNOLOGIYA in Russian  
No 4, Jul-Aug 91 (manuscript received 22 Jan 90)  
pp 64-66

[Article by O. V. Ostapenko, G. A. Serebrennikova and R. P. Yevstigneyev, Moscow Institute of Fine Chemical Technology imeni M. V. Lomonosov]; UDC 577.152.311:678.84

[Abstract] Trials were conducted on the efficiency of immobilization of *Echis multisqu amatus* venom on a variety of aminosilochromes, the latter differing in pore size, granulation, and surface concentration of  $\text{NH}_2$  groups. Maximum covalent coupling by the carbodiimide method at pH 4.8-5.2 for 20 h at 18-20°C was obtained with aminosilochromes with high  $\text{NH}_2$  concentrations (200  $\mu\text{Moles/g}$ ) and large pores (800 Å). However, high phospholipase  $\text{A}_2$  activity against diacyl and alkyl-acyl phosphatidylcholines was diffusion controlled and, consequently, highest specific activities were favored by small grain size (0.1-0.25 mm). Enzymatic activity was retained over five to six working cycles with no loss of activity on storage for six months. Figures 1; tables 3; references 10: 7 Russian, 3 Western.

### **Descriptive Epidemiology of Malignancies in Semipalatinsk Oblast of Kazakh SSR**

927C0216C Moscow VESTNIK AKADEMII  
MEDITSINSKIKH NAUK in Russian No 7, Jul 91  
(manuscript received 28 Apr 90) pp 59-63

[Article by M. A. Bulbulyan and G. D. Tokareva, All-Union Oncological Research Center, USSR Academy of Medical Sciences; USSR Ministry of Health, Moscow]; UDC 616-006.04-036.22(574.41)

[Abstract] In view of increasing appreciation of health hazards of ionizing radiation in areas with nuclear research, power or testing facilities, an epidemiologic assessment was conducted on the incidence and pattern of malignancies in the Semipalatinsk Oblast of Kazakhstan. The study dealt with epidemiologic data collected in 1959, 1970, 1979, 1985 and 1988. The age and sex standardized statistics demonstrated that in 1970 and 1979 the male malignancy rate in Semipalatinsk Oblast was 1.2-fold higher than the rate for the USSR, a trend retained in 1985 and 1988. In addition, in 1985 and 1988 esophageal cancer in Semipalatinsk men was 3.9- and 6.7-fold higher than the USSR average. Overall incidence of malignancy of women in Semipalatinsk Oblast 1.3-fold higher than the Soviet mean in 1970 and 1.7-fold higher in 1988. Concomitantly, the incidence of esophageal cancer was 3.9- and 6.9-fold greater, respectively. In general, the increase in overall incidence of malignancy in the oblast was in line with the global trends, but the higher overall statistics were due to excess esophageal malignancies. Figures 2; tables 4; references 5: 1 Russian, 4 Western.

### **Pituitary-Thyroid Function in Children and Adolescents Subjected to Radioactive Fallout From Chernobyl**

927C0223A Moscow MEDITSINSKAYA  
RADIOLOGIYA in Russian Vol 36 No 7, Jul 91  
(manuscript received 26 Jun 90) pp 4-7

[Article by A. F. Tsyb, Ye. G. Matviyenko, V. F. Gorbets, L. M. Tsypliykovskaya, V. K. Ivanov, O. Ye. Stadnik, S. A. Ayrapetov, E. V. Nilova, V. N. Omelchenko and M. P. Borovikova, All-Union Scientific Research Institute of Medical Radiology, USSR Academy of Medical Sciences, Obninsk]; UDC 616.432+616.441]-008.6-053.2-02:614.876 "Chernobyl"

[Abstract] Pediatric health monitoring was conducted over a three year period in the southeastern rayons of Kaluga Oblast exposed to Chernobyl fallout, with particular emphasis on thyroid function. The cohort consisted of a total 8500 individuals ranging in age from several weeks to 18 years. Immediately after the accident in 1986 screening revealed thyroid hyperplasia in 23 percent of the pediatric population, which was attributed to endemic goiter and unrelated to radioactive iodine in the fallout. Radioimmunoassay studies showed elevation of blood levels of thyrotropin ( $1.97 \pm 0.04$  mU/L in 1986;

$2.32 \pm 0.07$  mU/L in 1987;  $2.32$  mU/L in 1988) and corresponding depression of triiodothyronine ( $2.55 \pm 0.11$ ,  $2.39 \pm 0.06$  and  $1.73 \pm 0.01$  nM/L). Thyroxin concentrations were not as significantly affected, falling from a mean of  $113.3 \pm 2.9$  nM/L in 1986 to  $110.2 \pm 0.5$  nM/L in 1988. These findings demonstrate that long-term monitoring required to detect possible late sequelae. Thyroid activation in the cohort under consideration appears to reflect interaction stress and radioiodine uptake. Tables 3; references 8: 3 Russian, 5 Western.

### **Urban Pediatric Mortality in Proximity of Nuclear Energy Industry**

927C0223B Moscow MEDITSINSKAYA  
RADIOLOGIYA in Russian Vol 36 No 7, Jul 91  
(manuscript received 21 Jun 90) pp 7-10

[Article by F. D. Tretyakov, Z. I. Voronina, P. F. Voronin (dec) and S.N. Demin, Institute of Biophysics, USSR Ministry of Health, Moscow; UDC 614.73:621.039]:312.2-053.3

[Abstract] Pediatric mortality statistics for Chelyabinsk-40 were analyzed to determine whether occupational parental irradiation at industrial reactor sites and radiochemical plants poses a health risk for subsequent generations. The key cohort consisted of 38,124 children born in Chelyabinsk-40. Cumulative maternal and paternal  $\Gamma$ -irradiation in the 1950-1978 timeframe ranged from 10 to 400 and from 30 to 520 cSv, respectively. During the period in question pediatric mortality in Chelyabinsk-40 decreased 3.3-fold and throughout the entire period was some 30-40 percent lower than the analogous indicators for the USSR, RSFSR, and Chelyabinsk Oblast. Furthermore, the figures for the Chelyabinsk-40 children was an average of 2.1-fold lower than the general mortality figure for the city of Chelyabinsk. These findings indicate that exposure of the parents to levels of  $\Gamma$ -irradiation that exceeded the threshold limit value during the first ten years had no obvious adverse impact on the progeny. Furthermore, the differences in mortality between the target population and other populations were largely predicated on socioeconomic and biological factors. Tables 2; references 17: Russian

### **Mental Health and Job Performance After Recovery From Chernobyl-Related Radiation Injuries**

927C0223C Moscow MEDITSINSKAYA  
RADIOLOGIYA in Russian Vol 36 No 7, Jul 91  
(manuscript received 06 Sep 90) pp 10-13

[Article by F. S. Torubarov and O. V. Chinkina, Institute of Biophysics, USSR Ministry of Health, Moscow; UDC 616-001.28-036.11-02:614.876(477)]-036.86-7

[Abstract] Psychological status in relation to mental and physical job performance was assessed in a longitudinal fashion in operating personnel at the Chernobyl nuclear

power plant after recovery from acute radiation injuries. The subjects were subjected to neuropsychological testing, job performance evaluation and somatosensory testing at four to six months (45 subjects), 12-18 months (54), and 28-34 months (53). The results showed that the Chernobyl incident had a profound adverse effect apart from radiation injuries, and that mental adjustment and adaptation to work were determined by a general outlook on life, mental health status, and conditions of employment. After four to six months mental attitude and job performance were largely predicated on the clinical severity of radiation injuries, whereas after 12-18 months the key factors affecting mental health were conditions and nature of work. In the 28-34 month timeframe deterioration of mental health largely afflicted workers over 40 and those who suffered from more debilitating radiation injuries. However, personality remained the key determinant of adjustment. Tables 1; references 14: 6 Russian, 8 Western.

#### **Cytogenetic Analysis of Peripheral Blood Lymphocytes in Radiopolluted Rayons of Kaluga Oblast**

927C0223D Moscow MEDITSINSKAYA  
RADIOLOGIYA in Russian Vol 36 No 7, Jul 91  
(manuscript received 19 Mar 90) pp 50-52

[Article by N. P. Bochkov, L. D. Katosova, V. A. Sapacheva, V. I. Platonova, T. D. Smirnova and V. A. Pitkevich, All-Union Scientific Center of Medical Genetics, Moscow, and Scientific Research Institute of Medical Radiology, Obninsk, USSR Academy of Medical Sciences; UDC 616.155.32-018.13:575.224.23]-02:614.73]-076.5(470.318)

[Abstract] Cytogenetic analysis was carried out on peripheral blood lymphocytes of two male populations in Kaluga Oblast exposed to different levels of fallout from the Chernobyl accident. The study involved 17 men in the village of Mladensk where external radiation ranged from 670 mRem in 1986 to 289 mRem in 1989, and 16 men in Ogor with corresponding radioactivities of 272 and 151 mRem, respectively. The cytogenetic studies were carried out in May, 1989, when the level of Cs-137 radioactivity in the village of Mladensk was 3.7 Ci/km<sup>2</sup> and in Ogor 1.17 Ci/km<sup>2</sup>. The mean age of the 33 men was 38 years, with a range of 17 to 57 years. While the frequency of total chromosomal aberrations between the two villages did not differ significantly (Mladensk: 3.15/100 cells; Ogor 2.74/100) the frequencies of chromosomal exchanges were significantly higher in Mladensk (0.25/100) than in Ogor (0.062/100;  $p < 0.05$ ), i.e., the Mladensk findings exceeded three- to five-fold control figures in the literature while the Ogor data were on par with spontaneous chromosomal exchanges. Consequently, these results demonstrated that cytogenetic analysis is sufficiently sensitive to be used in monitoring radiopollution. Tables 2; references 6: 3 Russian, 3 Western.

#### **Environmental Health Effects of Nuclear Testing in Semipalatinsk**

927C0343A Stockholm DAGENS NYHETER  
in Swedish 23 Feb 92 pp 4-5

[Article by Anna-Maria Hagerfors: "Evil Legacy"—first paragraph is DAGENS NYHETER introduction]

[Text] In Chernobyl, Hiroshima and Nagasaki it happened once. In Semipalatinsk in Kazakhstan it happened 486 times. For 40 years, until 1989, the Soviet Union conducted test blasts of atomic and hydrogen bombs in the midst of 1.5 million people. Today 800,000 suffer from severe radiation damage. The genetic material has been damaged. One out of three children are deformed, have cancer or have defective immune systems. The next generation will not be able to survive.

From a distance the town of Salshal looks like a Swedish Christmas wall hanging. A father arranges a sleigh full of shrieking youngsters, urges the horse on and gives them a wild ride. But close at hand it can be seen. Several of the children who swing their bags outside the school are unnaturally pale, others look retarded. Some have something wrong with their legs or two stripes of blood beneath their noses.

Bibigul Balagasin is a 13-year-old who lives on the outskirts of town. She is one of the third generation of radiation victims in Salshal. Bibigul is physically deformed and mentally retarded.

Her mother was born in 1949 at a distance of 10 kilometers from the test site. That was the year they began above-ground testing. Bibigul's maternal grandmother was out looking at the atomic mushroom cloud like everyone else and her mother was born with slight brain damage. Her mother is now in the hospital because her immune system is also defective and she gets one disease after another.

So her father takes care of Bibigul and her sister Sirkul, who is 12. But their father is not normal either. He has congenital brain damage and could scarcely make himself understood when we tried to interview him.

There is nothing wrong with the younger sister, Sirkul. She is the one who runs the house. She stood silent, observing us with lively intelligent eyes.

Out on the town street we ran into a shambling disfigured boy who made a sign that he wanted some cigarettes.

"Go home, Serikshan," said the town's authoritative sovkhos (state farm) chairman.

"It is terrible. He just wanders around all the time yelling and fighting and begging for cigarettes. He is 15 and cannot talk and has never gone to school."

At Serikshan's home his mother, Mana Nurmagan, stood cutting up a piece of the sovkhos's radioactive meat for dinner.

"Serikshan had convulsions when he was just a baby. When I was pregnant we lived in a town that is even closer to the test area than this. Now I know that his illness is due to the fact that I went outside and looked at the blasts."

#### Last Station

Mana has a statement from the specialists in Semipalatinsk that her son has the genetic damage that is so common in the third generation. She is angry that she did not get a disability pension for him.

The test bombs were detonated on Saturday mornings at 10 o'clock at a distance of 20 kilometers from Salshal.

The ground shook for 150 kilometers around. Children and adults were ordered outside so the houses would not fall in on them.

The charges were as much as 150 kilotons compared with 13 kilotons at Hiroshima.

North of the town of Salshal where the railroad ends stands a building bearing the sign "Last Station." Here lies the secret military town, Kurtyatov, which does not appear on any map. Some 20,000 nuclear weapons experts, military personnel and their families live here. From 1949 to 1989 the people who got off the train at Last Station exploded a total of 116 nuclear charges above ground and 370 below ground.

The town is still closed and DAGENS NYHETER was not allowed to go there.

Around the test site live 1.5 million people in farm villages and in Semipalatinsk, a big industrial and university city in northeast Kazakhstan. Not until the blasts stopped two years ago were foreigners allowed to visit the region.

"Now we feel we are no longer alone. We are all one on this planet," said the sovkhos chairman in the town of Znameka.

Cows strolled freely along the town streets and made way for sleighs between the snowbanks. Sakya Achmet, who receives disability benefits, patted his steaming horse and told us:

"When the first bomb was exploded on 29 August 1949 I was given sunglasses for protection. We heard a tremendous bang. It became very light, the whole steppe was brightly illuminated. We stood and looked and understood nothing."

#### Always Sick

Achmet is now 64 years old. Then he was a young recruit who was ordered to dig cement bunkers out on the future test site.

"When I left the army I signed a paper that I would not disclose anything."

Achmet's oldest son was born before 1949. He is completely healthy. But the two younger children have lowered immune defenses and are often sick. Two of his grandchildren were born with deformities and died.

Aitkazy Tulakbayev is the town doctor. He has worked among people with radiation sickness for 26 years:

"People began dying of leukemia as early as the 1950's," he said. "The number of deformed children began to increase in the 1970's. It was very hard to be a doctor because we were forced to write false diagnoses."

Not until recent years have the environmental movement and the researchers in Semipalatinsk managed to provide a total picture of health conditions. The information below is from 1988:

- In towns near the test site 18 percent, almost one out of every five inhabitants, had cancer.
- The number of children with brain damage and mental retardation had increased sevenfold since 1980.
- One child in three born in 1988 was stillborn or so deformed that its life was terminated.
- Half the pregnant women had chronic anemia. As many as 80 percent had toxemia of pregnancy.
- Every third adult and eight out of 10 children suffered from chronic infections because their immune systems were defective.

In Salshal the sovkhos chairman told us that the test site outside town is not even fenced off.

"In November 60 sheep and two horses died on the same day out there on the steppe. Our shepherds came back and reported that they had seen open bore holes. We rode out there and measured 1,200 microroentgens. (The natural background radiation level is 10-20 microroentgens per hour.)

"Of course we called in the military, but then came the snow so we do not know if they have covered up the holes."

We asked if they allowed the animals to graze out there.

"We cannot avoid it. The military have set up small signs saying 'Beware of radioactivity,' but the sheep cannot read."

We asked if the people then eat the sheep?

"Yes, what else are they supposed to eat?"

Outside town on the steppe are cemeteries that look like miniature Moorish towns with spires, walls and cupolas. Each major family group has its own. The Kazhaks keep track of their ancestors for nine generations back.

Deshanta Kazmenov accompanied us to one of the cemeteries that we could get to through the ice and snow. He is 65 years old and knows all of the 700 families in town.

"Out there is the test site," he said, pointing out over the steppe. "A few kilometers in that direction you can see wolves and foxes that drag themselves along and have lost their fur."

#### No Future

Deshanta led us around among the graves that resembled small mausoleums. We plodded and slipped and took refuge from the icy wind from the steppe.

"Here lie many of the 25 young people who have committed suicide in the town of Sarshal in the last 10 years.

"Here we have Acxat, 30 years old. He hanged himself. And over there lies Bolat, 21. His mother found him hanging in the storeroom.

"Here lies Tulegen, 19 years old. He was in the army when he hanged himself. And here lies Risken. She was 12 when she hanged herself from the bedpost.

"I remember Chamur very well. He was 15 and he was doing well in school. But he hanged himself anyway.

"They kept getting sick over and over again, became very depressed and saw no future," said Deshanta.

#### Victims Studied Secretly for 30 Years

Since 1961 people with radiation sickness in Semipalatinsk have been studied in secret like laboratory animals. The activity was carried out at the Institute for Foot-and-Mouth Disease.

"But I have no regrets," chief medical officer Gennadiy Kavretskiy told DAGENS NYHETER. "I was a patriot and proud of my contribution. The important thing was to produce an effective nuclear weapon."

Last year the Institute for Foot-and-Mouth Disease was turned into the Institute for Radiation Medicine and Ecology.

"Now we will help people instead of just studying them," said the ambitious new research chief, Alexander Sekerbayev.

But the old chief medical officer is still at work. For 30 years Kavretskiy secretly studied the increasing damage to people living around the test site. He also monitored the radioactivity in the water, air and food continuously.

After the last test blast in 1989 the military classified his documentation covering 28 years as secret and sent it all to Moscow. Now the parliament of Kazakhstan is demanding access to all the facts so they can be published.

[Hagerfors] What was the purpose of this activity?

[Kavretskiy] To study how the environment and living organisms react when they are exposed to radiation. It was valuable Soviet defense material.

[Hagerfors] How did it feel as a doctor to be unable to sound the alarm when children started to be born with deformities?

[Kavretskiy] I had no sense of guilt. I saw it as my duty to participate in the experiment. I reported everything to Moscow. I was born here and have been as affected by the radioactivity as everyone else.

[Hagerfors] Do you have children of your own?

[Kavretskiy] No.

[Hagerfors] Independent researchers say the next generation will not be viable. You must have realized that a long time ago.

[Kavretskiy] If that is true it is a result of the above-ground blasts before my time. The third and fourth generation have had hereditary diseases. But now people are not being exposed to radioactivity. They can safely eat their sheep.

#### Should Become Health Resort

Another of the people in charge, General Viktor Petrushenko, actually believes living in Semipalatinsk is so healthy that the area should be turned into a health resort.

He said this to visiting Russian journalists last fall and illustrated his point by making his 12-year-old son bathe in Atomic Lake.

Atomic Lake is an artificial lake created by a nuclear charge that was detonated "for national economic purposes."

We were unable to see Petrushenko, but we did meet the general who had the highest responsibility for the actual explosions. He is Fyodor Safonov, a man who shows obvious signs of heavy drinking. Like Dr. Kavretskiy he blames the above-ground tests conducted before his time.

"There has been no risk after that," he said. "For 24 years I have personally stood watching the blasts at a distance of three to four kilometers from the test site, and I am completely healthy."

[Hagerfors] But you have observed fissures in the ground yourself. An earthquake has occurred as a result of the blasts, according to independent geologists. They also found that an underground coal seam had been burning at the test site for the last five years. You have had to pile dirt on it to control the smoke. Is that not dangerous?

[Safonov] The radiation stays underground.

[Hagerfors] But it is known that radioactivity accumulates in grass roots. The sheep eat the grass, and people, who are the last link in the food chain, get the biggest dose.

[Safonov] You believe the environmentalists, not me. I have no use for emotional arguments.

[Hagerfors] As a journalist I have seen a lot of things. But few have disturbed me as much as these large-scale experiments involving people's lives and futures. How has it affected you personally?

Now General Safonov became irritated and his face turned even redder.

[Safonov] I said all the problems concern the first period. Not the time I have been here!

[Hagerfors] So during your 24 years no one has been harmed by radioactivity?

[Safonov] No, underground tests are not dangerous.

"He does not know yet what his grandchildren will look like," Maira Zhangelova commented dryly. She is a professor of biochemistry at the Medical Institute in Semipalatinsk.

Zhangelova is also a member of the Kazakhstan parliament where she heads a commission to coordinate research and health care in the area and look into whether the victims should be given "Chernobyl status," i.e. receive compensation for injuries and the right to clean food and possibly resettlement.

"It is a downright lie to say that underground tests are not dangerous," she went on. "The radioactivity streams up through crevices in the earth and spreads over densely-populated areas. After the last bomb blast we measured 300 times the natural background radiation level.

"In Sweden you could slaughter the reindeer after Chernobyl because you had other things to eat. Here the people have nothing but their sheep.

"Since we researchers were given a free hand we have observed that the genetic material is damaged in many third-generation children. The next generation will not be viable.

"We who live here will die out."

Zhangelova is one of the driving forces in the environmental movement, Nevada-Semipalatinsk, which is now working with radiation victims in the state of Nevada in

the United States. Many of Kazakhstan's leading scientists, authors and stars are active.

The movement is thinking of holding an international conference in the capital, Alma-Ata, in April, and hopes to get assistance from western radiation specialists.

#### Equipment Lacking

The goal is to form a joint organization for all victims of test blasts, including the French tests on Moruroa, the Chinese tests in Lapnoh and the domestic ones in the other Soviet test blast area, the peninsula of Novaya Zemlya in the Arctic Ocean.

In Novaya Zemlya every tenth child now dies before it is one year old. There are ten times more cancer cases than there are in the rest of the former Soviet Union.

There have been enough institutions, hospitals and radiation specialists in Semipalatinsk to take care of the victims in the last couple of years. But they lack equipment and medicine. Before the dissolution of the Soviet empire drugs and instruments came from Russia and Ukraine. Now the independent republics have come to realize that they need medicine and equipment themselves.

#### Kazakhstan Risks Running Out Soon.

At the children's hospital in Semipalatinsk surgeons perform operations with razor blades.

There we met Marat, five years old, who was being treated for his webbed fingers.

Dina, eight, in the next bed was one of the many children born with leg deformities.

Timur, one and one-half years old, had microcephaly, in other words an abnormally small head. In addition he had a cleft palate and deformed feet.

Gulnas, two years old, was hydrocephalic and showed signs of being severely mentally retarded.

"The genetic code has been altered in our children," said senior physician Serikbol Musinov.

"In spite of that the military authorities refuse to give us charts that would show the percentage and effects of the various radioactive substances in the areas where the children live."



**Activation of Ty Transposition Cycle by HIV Reverse Transcriptase in *Saccharomyces Cerevisiae***

927C0275A Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 318 No 2, May 91 (manuscript received 19 Feb 91) pp 739-742

[Article by N. L. Reznik, O. V. Kidgotko and N. G. Shuppe, Institute of General Genetics imeni N.I. Vavilov, USSR Academy of Sciences, Moscow; UDC 575.113

[Abstract] Studies on the modulation and mechanisms of Ty transposition in *Saccharomyces cerevisiae* involved the demonstration that the process may be induced by exogenous reverse transcriptase (RT), in addition to exogenous Ty elements. Accordingly, transformation of the yeast with plasmid pAB24/RT, encoding HIV RT, also showed that expression of HIV RT was accompanied by Ty transposition. Insofar as could be determined, the Ty virus-like particles induced by either exogenous Ty or HIV RT consisted of essentially identical nucleoprotein complexes. Figures 3; tables 1; references 14: 3 Russian, 11 Western.

**Features of the Expression of the Genome of the *Pseudomonas aeruginosa* Phage-Transposon D3112 in *Escherichia coli*: Relationship of Bacterial Phenotype to Number of Copies of D3112 Genome**

927C0277 Moscow GENETIKA in Russian Vol 27 No 8, Aug 91 (manuscript received 18 Dec 90) pp 1324-1335

[Article by M. A. Trenina, V. Z. Akhverdyan, L. G. Kolibaba, B. A. Rebentish, and V. N. Krylov, All-Union Scientific Research Institute of Genetics and Selection of Microorganisms, Moscow; UDC 578.81:579.25.5:579.84.11:579.842.11

[Abstract] Study of the expression of a foreign material in bacteria helps us to understand the process underlying the exchange of genetic information between species and to learn more about the systems for protecting the cell from the entry of foreign genes. The researchers here chose to analyze clones that had lost the Tcs (thirty-centigrade sensitivity) phenotype, i.e., Tcr clones. They also found so-called Tcl thirty centigrade low sensitivity clones, whose bacteria formed colonies at 30°C and produced the phage D3112. Tcl clones were unstable at 30°C, as evidenced by sectors of secondary growth. The researchers demonstrated that Tcl clones manifest the formation of a cointegrate between the hybrid plasmid RP4::D3112 and the *E. coli* chromosome, which led to a lower number of copies of the D3112 phage genomes on the cell and reduced effectiveness in the expression of phage genes. The researchers did molecular mapping of the phage and plasmid DNA in the bacterial chromosome of certain Tcl clones. They found deletions of phage and plasmid genes and a relationship between bacterial growth at 30°C and number of copies of D3112 phage genome on the *E. coli* bacteria. Figures 7, references 18: 13 Russian, 5 Western.

**Microphotometer IFO-451 in Immunoenzyme Assays**

927C0226B Kazan KAZANSKIY MEDITSINSKIY ZHURNAL in Russian Vol 71 no 6, Jun 91 (manuscript received 10 May 90) pp 461-462

[Article by A.F. Kharasov, K.T. Shakirov, N.A. Safina, I.G. Mustafin and O.D. Zinkevich, Immunology and Biochemistry Laboratory, Kazan Scientific Research Institute of Epidemiology and Microbiology; UDC 617.518-001.4-003.215-07-089.8

[Abstract] Cursory description is provided of the adaptation of the Soviet microphotometer IFO-451 to ELISA automation. Basically, a special holder has been designed for the planchettes to facilitate OD determination. The microphotometer was equipped with a blue-green (492 nm max.) filter and the test was set up to use o-phenylenediamine as the chromogenic substrate. Quantification is based on the fact that the height of the OD peaks is inversely related to antigen concentration. Figures 3; references 5: 2 Russian, 3 Western.

**Mechanism of Differentiated Influence of Small Doses of Adaptogens on Functional Activity of Normal and Transformed Cell Elements in Vitro**

927C0279 Moscow BIOFIZIKA in Russian Vol 36 No 4, Jul-Aug 91 (manuscript received 28 May 90) pp 624-627

[Article by S. N. Udintsev, V. P. Shakhov, and I. G. Borovskiy, Scientific Research Institute of Pharmacology, Tomsk Science Center, USSR Academy of Medical Sciences; Scientific Research Institute of Applied Mathematics and Mechanics, Tomsk State University]

[Abstract] A parallel winter-time study was performed of the effect of aqueous solutions of the phenol rosewort compound at various concentrations on the colony-forming activity of bone-marrow cells and cells of the ascitic Ehrlich tumor in male CBA mice in vitro. Also studied was the effect of actinomycin D on colony-formation. Spline approximation was used in processing the data. The researchers identified a periodicity of rosewort effects that differed for the two types of cells, and at concentrations of  $1 \times 10^{-2}$  M and  $1 \times 10^{-26}$  M, colony-forming activity was stimulated in the bone-marrow cells, but inhibited in the Ehrlich tumor cells.

The addition of actinomycin D—a DNA-dependent RNA-polymerase blocker—demonstrated no consistent inhibiting effect with regard to colony-formation, except when introduced with the rosewort, in which case the curve depicting rosewort's effect on the bone-marrow cells was shifted, with its shape remaining the same. For the tumor cells, the addition of actinomycin D produced a change in shape that reduced the period of the curve threefold, with the stimulation of colony-formation disappearing completely. Figures 2, references 9: 8 Russian, 1 Western.

**Plant Alkaloid From *Ammopiptantus mongolica*—Inhibitor of Nitrogen Oxide Synthesis in the Animal Body**

927C0279 Moscow BIOFIZIKA in Russian Vol 36 No 4, Jul-Aug 91 (manuscript received 28 Aug 90) pp 700-702

[Article by B. Burgedbazar, L. N. Kubrina, V. Yu. Yegorov, and A. F. Vanin, Institute of Biotechnology, Mongolian Academy of Sciences, Ulan-Bator; Institute of Chemical Physics imeni N. N. Semanova, USSR Academy of Sciences, Moscow]

[Abstract] Endogenous nitrogen oxide is produced in animal tissue in vitro and in vivo, and it performs the function of secondary messenger in the system for regulating cell metabolism in neurons, blood vessels, and macrophages. In a search for compounds that can affect the formation of nitrogen oxide, the researchers here studied the effect of an alkaloid extracted from *Ammopiptantus mongolica*, which grows in the Gobi Desert only, on white, outbred mice. The alkaloid is an antioxidant whose introduction into animal feed produces an increase in biomass and resistance to various diseases. The researchers found the alkaloid to be similar in antioxidant characteristics to ionol. In doses of 8-10 µg/animal, the alkaloid reduced considerably the amount of nitrogen oxide that had been formed in the liver by the introduction of a lipopolysaccharide. The alkaloid was found to weaken the formation of mononitrosyl complexes of iron and diethyldithiocarbamate in controls as well as experimental animals. The assumption was made that free radicals reacting with the antioxidant raise the level of free calcium in the cell. Figures 1, references 9: 3 Russian, 6 Western.

**The Influence of Fluorocarbon Gas-Carrying "Artificial Blood" on Brain Tissue  $pO_2$  Under Normal and Ischemic Conditions**

927C0177A Tbilisi SOOBShCHENIYA AKADEMII  
NAUK GRUZII in Georgian Vol 141 No 2, Feb 91  
pp 413-416

[Article under rubric "Experimental Medicine" by M. B. Lomia of the Georgian Academy of Sciences Physiology Institute and Tbilisi State Medical Institute; submitted by Academician T. Dekanosidze, 16 Jan 1991; UDC 616.831—005.4

[Text] The foreign scientific press has published a number of articles about the use of perfluorocarbonic [PFC] gas-carrying hemocorrector blood substitutes in various vascular disorders. Good results have come from the experimental use of these compounds in cases of hemorrhagic shock <sup>1</sup> and the breakdown of blood circulation to the heart <sup>2</sup> and the brain. This group of compounds has been used successfully for the experimental perfusion of donor organs <sup>3</sup> and for the diagnosis and treatment of malignant tumors <sup>4</sup>. "Artificial blood" has been used to carry out many experiments in the treatment of various surgical pathologies <sup>5</sup>.

Several articles have reported the compound's considerable effectiveness in cases of damage to the brain's vascular system <sup>6</sup>.

It is known that normal functioning of nerve tissue greatly depends on a constant supply of oxygen to it <sup>7</sup>, which in turn depends mainly on the state of the brain's vascular system. In view of the above, we set the task of studying the PFC compound's effect on the supply of oxygen to the brain under ischemic conditions.

We carried out the experiments on fully-grown rabbits (between 1.5 and 2.5 kilograms), 11 animals in all.

After a general anesthesia (0.5 ml/kg of kalipsol and 50 mg/kg of nembutal) we performed a tracheotomy and catheterized the animal's femoral artery and vein in order to measure systemic arterial pressure and administer the PFC compound. We also separated out both carotid arteries, to which we fastened special clamps (clips). After draining the fourth cerebral ventricle and trepanning the skull, we put the animal on artificial ventilation using the Vita apparatus, simultaneously injecting about 0.3 ml of tubocurarine hydrochloride into the vein.

During the experiment we constantly measured the partial oxygen pressure ( $pO_2$ ) in the brain tissue using a semi-enclosed platinum electrode whose active end was covered with a roflex membrane (Rom-Haas Company, USA) which was selectively sensitive to oxygen, and we measured systemic arterial pressure.

After recording the background data we clamped the carotid arteries for five to 10 minutes under conditions of normal air respiration. Then we replaced the air with 100 percent oxygen. After loosening the clips we injected

the PFC emulsion compound into the vein on the background of oxygen respiration at the rate of one to three ml/min (20-25 ml/kg) and again clamped the carotid arteries. This compound contains a PFC fraction of 23 percent by volume or 43 percent by weight.

In the control group (five animals), under the same experimental conditions, we administered rheopolyglucin to the animals instead of the PFC emulsion.

The essence of the experiments, then, was to study the effect of PFC emulsion on partial oxygen pressure in the brain under normal conditions and during cerebral ischemia.

As a rule, clamping the carotid arteries induced a substantial decrease of the  $pO_2$  in the brain tissue during both air and oxygen respiration.

After intravenous injection of the PFC compound under normal conditions we produced a steady rise (ranging between 10 and 80 mm mercury column) of the  $pO_2$  of the brain tissue in eight animals, which is quite pronounced after injecting just 15 ml of the compound. In the process, there is practically no change in the systemic arterial pressure (we observed only a brief rise in the range of five mm mercury column). In the same animals, clamping the carotid arteries induced a drop in the  $pO_2$  on a higher or on the same level as in the case of the  $pO_2$  of the non-ischemized brain tissue during oxygen respiration. In the other three animals, no change at all was recorded in the  $pO_2$  level after injecting the PFC compound. Neither did clamping the carotid arteries in the same animals (on the background of the compound) induce variability in the  $pO_2$ , although when the carotid arteries were clamped in the three animals without the compound, a substantial drop in the  $pO_2$  was observed during both air and oxygen respiration.

In the control group, to which we administered rheopolyglucin instead of the PFC compound, these phenomena were not observed to occur.

The results show that the PFC compound effectively increases partial oxygen pressure in brain tissue under ischemic conditions, which plays a decisive role in maintaining the metabolism and functions of the nerve cells.

This effect by the PFC compound may be caused basically by the following factors:

1. Hemodilution, which results in improvement of the blood's rheological properties.
2. The presence of emulsifiers (surface active agents) in the PFC compounds, which hinders the aggregation of both emulsion particles and blood cells, thus improving the blood's rheological properties.
3. Fundamentally new properties of the PFC emulsions—they carry blood gases by particles whose diameter (0.1—0.2 microns) is 30 to 70 times smaller than erythrocytes. For this reason these particles reach the

ischemized zone and induce intensive gas exchange. It should be noted that because the compound uniformly "sucks in" all the gases of the air, it only performs its main function (effective transporting of oxygen in the blood) when respiration takes place with a mix of gases in which the oxygen content is at least 70 percent.

The investigation enables us to assume that PFC emulsions will find extensive use in clinical practice as effective hemocorrectors, especially in cases of various types of pathology of the cardiovascular system.

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#### Annular Corneal Tunnel Grafts for Correction of Severe Myopia

927C0225A Moscow VESTNIK OFTALMOLOGII in Russian Vol 107 No 3, May-Jun 91 (manuscript received 05 Jul 90) pp 23-31

[Article by N. E. Temirov and A. P. Korkhov, No 1 Chair of Eye Diseases, Rostov Medical Institute; UDC 617.753.29-089:617.713-089.844

[Abstract] Technical details are presented on tunnel keratoplasty for correction of severe myopia as a relatively nontraumatic technique in comparison with radial keratotomy. The essential features of this procedure have been described in Invention Certificate No. 4454511/14, 04 Jul 88. The procedure consists of creation of a paracentral circular tunnel in the superficial corneal layers with nerve retention and insertion of a collagen fiber prepared from donor cornea. Successful dog trials were followed by trials on 23 patient (32 eyes) with a six month to two year follow-up. The results demonstrated stable reduction in refraction by 12.0 to 15.0 diopters. Uncorrected visual acuity was improved from 0.01-0.08 to 0.09-0.2 in 50 percent of the eyes and to 0.3-1.0 in 43.7 percent. Weak astigmatism (to 0.5 diopters) was noted in four (12.5 percent) eyes. Major

complications consisted of one case of corneal delamination and one of local infiltration of the collagen fiber which required surgical reversal. The good agreement between computer-calculated and measured corrections indicate that this method deserves further clinical consideration. Figures 10; tables 2; references 8: Russian.

#### Cardioprotective Effects of Coenzyme Q<sub>9</sub>/Cyclohexyladenosine Combination in Ischemia, Reperfusion and Acute Myocardial Infarction

927C0225B Moscow KARDIOLOGIYA in Russian Vol 31 No 6, Jun 91 (manuscript received 17 May 90) pp 73-76

[Article by F. Z. Meyerson, V. I. Vovk, O. M. Pozdnyakov, M. Ye. Yevseyeva, Ye. A. Obolnikova, G. I. Samokhvalov and V. V. Slobodyanik, Scientific Research Institute of General Pathology and Pathologic Physiology, USSR Academy of Medical Sciences, Moscow; Kishinev and Stavropol Medical Institutes; 'Vitaminy' Scientific Industrial Association, Moscow; UDC 616.12-008.46-085.22:547.436

[Abstract] Cardioprotective efficacies of coenzyme Q<sub>9</sub> (CEQ; antioxidant) and cyclohexyladenosine (CHA; coronary vasodilator), alone or in combination, were tested on 250-280 g male Wistar rats. The experimental models consisted of 10 min carotid artery ligation for temporary induction of myocardial ischemia, or coronary artery ligation for induction of acute myocardial infarction (AMI). Pretreatment of the anesthetized (50 mg/kg pentobarbital) animals with oral CEQ (100 mg/kg) or CHA (10 µg/kg), or both, for five days, including two h before carotid ligation, yielded alleviation of ventricular tachycardia and fibrillation. The combination therapy was most effective, reducing the duration of tachycardia five-fold and completely precluding fibrillation. Furthermore, the effects were additive rather than synergistic. In the AMI model, in which treatment was extended to the two AMI days, combined therapy was most effective in raising the threshold for ventricular fibrillation (1.0 mA for untreated rats, 2.0 mA with CHE, 2.25 mA with CEQ, 3.44 mA for combined therapy, 7.2 mA for control rats). CEQ alone was especially effective in reducing myocardial necrosis (by 42 percent after two days), while CHA had primarily an anti-ischemic effect, reducing the degree of ischemia by 25 percent after five min and, as a consequence, two day necrosis by 37 percent. Combined therapy reduced myocardial necrosis 2.1-fold vis-a-vis control damage, suggesting that clinical trials with CEQ and CHA are warranted. Tables 3; references 22: 3 Russian, 19 Western.

#### Experimental Therapeutic Trials With Taurine in Congestive Heart Failure

927C0225C Moscow KARDIOLOGIYA in Russian Vol 31 No 6, Jun 91 (manuscript received 02 Apr 90) pp 77-80

[Article by Ts. R. Orlova, Ye. P. Yelizarova, I. M. Ryff, N. I. Fetisova and L. I. Mitkina, Institute of Experimental Cardiology, All-Union Cardiological Scientific

Center, USSR Academy of Medical Sciences, Moscow; UDC 616.12-008.46-085.22:547.436

[Abstract] Experimental therapeutic trials were conducted with taurine to ascertain its efficacy in congestive heart failure. The experiments involved 2.5-3 k chinchilla rabbits with aortic valve damage treated per os for two mos. with 10 or 100 mg/kg of taurine or 0.5 g of potassium orotate. The 12 week mortality in untreated controls was 50 percent, 45 percent in the orotate groups, 11.1 percent (2/18) in the 10 mg/kg taurine group, and zero mortality in the 100 mg/kg taurine animals. Hemodynamic monitoring demonstrated that taurine enhanced myocardial functional reserve and tolerance of stress, including challenge with exogenous  $\text{CaCl}_2$  and epinephrine. The mechanism of action of taurine can be attributed to prevention of cellular overload with calcium ions. These observations complement ongoing clinical trials with taukard [sic], a taurine-based oral cardiac agent. Tables 1; references 20: 4 Russian, 16 Western.

#### Diagnostic and Therapeutic Trials With Troventol in Bronchial Asthma

927C0226A Moscow TERAPEVTICHESKIY ARKHIV in Russian Vol 63 No 3, Mar 91 90 (manuscript received 04 Apr 90) pp 85-87

[Article by A.A. Khadartsev, G.Ya. Shvarts and I.G. Danilyak, Tula Oblast Hospital; UDC 616.248-085.217.34

[Abstract] Patients with bronchial asthma and pollinosis were employed in diagnostic and therapeutic trials with the Soviet bronchodilator Troventol ( $\alpha$ -hydroxybutyric- $\alpha$ -phenylbutyric tropine iodomethylate). Preliminary studies on male and female asthmatics showed that two inhalations of Troventol resulted in maximum bronchodilation in 30 min, with the benefits lasting for three h. Management of 143 patients with bronchial asthma with Troventol (two doses four four times a day for 10 days; two to three week follow-up) yielded excellent clinical results in 97 (67.8 percent), satisfactory results in 24 (16.8 percent), and an unsatisfactory outcome in 22 (15.4 percent). Side effects consisted of tachycardia in three (2.5 percent) of the patients, bradycardia in six (5.1 percent), xerostomatia in 12 (10.1 percent), and nausea and olfactory discomfort in six (5.1 percent). In addition, pulmonary function studies on 38 patients with pollinosis demonstrated that Troventol had diagnostic utility in latent bronchospastic syndrome. In general, Troventol was shown to be a fairly promising bronchodilator. Tables 3; references 13: 8 Russian, 4 Western.

#### Use of Oncoprecipitins in Immunodiagnosis of Human Tumors

927C0311A Kiev EKSPERIMENTALNAYA ONKOLOGIYA in Russian Vol 13 No 4, Jul-Aug 91 (manuscript received 28 Jan 91) pp 39-41

[Article by A. F. Pavlenko, I. V. Chikalovets, A. V. Kurika, Yu. S. Ovodov, Pacific Ocean Institute of Bioorganic Chemistry, Far Eastern Department, USSR Academy of Sciences, Vladivostok; UDC 616.006-047

[Abstract] Working with the blood sera of 55 essentially healthy people and in 14 individuals with gastrointestinal tumors, as well as with extracts of tumorous and normal human tissue, the researchers here assessed the diagnostic value of an oncoprecipitin isolated from marine invertebrates (crustacin from *Pagurus prideauxii*). They found a CEA-crustacin test system with a sensitivity of six  $\mu\text{g/ml}$  CEA to be more sensitive with tumor extracts than was the standard CEA-antibody test system, owing probably to structural differences in the CEA antigen determinants. The researchers developed a variation of EIA for CEA determination that used crustacin instead of CEA antibodies, and they identified CEA levels of 5-40 ng/ml in four adenocarcinoma patients (the normal level is  $2.2 \pm 1.8$  ng/ml). References 12: 8 Russian, 4 Western.

#### Study of Antitumor Effect of Extracorporeal Immunosorption of Blood Plasma in Rats With Guerin Carcinoma

927C0311B Kiev EKSPERIMENTALNAYA ONKOLOGIYA in Russian Vol 13 No 4, Jul-Aug 91 (manuscript received 22 Oct 90) pp 66-70

[Article by V. A. Semernikov, A. V. Sobko, S. V. Khutornoy, V. G. Nikolayev, V. L. Ponomarev, L. V. Bonatskaya, and Ya. F. Kovalishin, Institute of Problems of Oncology and Radiobiology imeni R. Ye. Kavetskiy, UkSSR Academy of Sciences, Kiev; UDC 616-006.6:615-246.9

[Abstract] Sorption techniques are widely used to cleanse the whole blood or plasma of cancer patients of various pathogenic substances. Immunosorption based on extracorporeal infusion produces positive effects as a result of the capability of protein A to remove IgG subclasses one, two, and four from the plasma, as well as serum blocking immunocomplexes. Owing to the fact that the development of methods for simultaneous removal of toxic metabolites and immunity-blocking complexes may be promising for sorption therapy of tumors, the researchers here performed an experimental verification of the effectiveness of extracorporeal immunosorption against tumors in rats with Guerin carcinoma. The immunosorbents consisted of cells of *St. aureus* Cowan 1 immobilized on a carbon fiber matrix with high sorption capability in terms of various toxic compounds. Tumor growth regression and retardation were observed in the rats and were attributed to the elimination of immunocomplexes formed by tumor-associated antigens and antibodies to them, which led to elevation of the killer activity of tumor-committed lymphocytes and to increased production of cytotoxic antibodies. The matrix proved to be capable of absorbing toxic derivatives of the immobilized bacterial cells and sorbing the  $\text{C}_{3a}$  and  $\text{C}_{5a}$  components of the complement activated in immunosorption. Figures 2, references 22: 5 Russian, 17 Western.

**Soil Micromycete Complexes in Areas Exposed to Chernobyl Fallout**

927C0238A Kiev *MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 53 No 4, Jul-Aug 91* (manuscript received 15 Oct 90) pp 3-9

[Article by N. N. Zhdanova, A. I. Vasilevskaya, L. V. Artyshkova, V. I. Gavriluk, T. N. Lashko and Yu. S. Sadovnikov, Institute of Microbiology and Virology and of Nuclear Research, Ukrainian SSR Academy of Sciences, Kiev; UDC 582.288.4:58.02

[Abstract] Soil samples obtained in the 1986-1989 time-frame in the 30 km Chernobyl fallout zone were analyzed for micromycete complexes as part of a comprehensive ecologic impact assessment. The 200 samples yielded more than 700 fungal cultures representing 68 genera and 152 species. Application of statistical pleiad correlation methodology to the complexes revealed profound changes within four months of the explosion, consisting essentially of disappearance of nonpigmented species. Subsequent temporal intervals were marked by gradual recovery of normally encountered complexes. In general, highly radiopolluted soils ( $10E-5$  to  $10E-3$  Ci/kg) yielded complexes consisting only of melanin-producing fungi which were rarely isolated in that area prior to the explosion. Figures 4; references 13: 12 Russian, 1 Western.

**Impact of Culture Media on Ethylene Glycol Dehydrogenase Isoenzymes of *Azotobacter Vinelandii***

927C0238B Kiev *MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 53 No 4, Jul-Aug 91* (manuscript received 28 Jun 91) pp 40-43

[Article by M. B. Tsinberg, L. F. Dobrynina, M. N. Nenasheva, N. F. Mogilevich and P. I. Gvozdyak, VolgoUral Gas Research and Engineering Institute, Orenburg; Institute of Colloid Chemistry and Water Chemistry, Ukrainian SSR Academy of Sciences, Kiev; UDC 579.841

[Abstract] An analysis was conducted on the isoenzyme spectra of ethylene glycol dehydrogenase (EGDH) produced by the sludge bacterium *Zotobacter vinelandii* Mg VKPM B-4213 in relation to culture conditions. The latter consisted of growth at 30°C either on fish meal nutrient agar or synthetic medium of the following composition (in g/L): 0.50 NaCl, 0.40  $KH_2PO_4$ , 0.05  $MgSO_4$ , 0.03  $CaSO_4$ , 0.01  $FeSO_4$ , 0.15  $NH_4Cl$ , 2.0 ethylene glycol, 20.0 agar, distilled  $H_2$ ) to 1 L, pH 8.0. The results demonstrated that the mutiple molecular forms EGDH were subject to modulation by the conditions of cultivation, with comparative analysis of the stained bands obtained with polyacrylamide gel disk electrophoretic revealing different isoenzyme patterns. The differences were accounted for by the fact that on the synthetic medium *A. vinelandii* produced one

NADP- and four NAD-dependent inducible molecular forms of EGDH. Figures 2; references 10: 1 Polish, 6 Russian, 3 Western.

**Isolation of Membrane-Bound RNA Replicase From Potato Virus X-Infected Thorn Apple by Ion-Exchange Chromatography**

927C0238C Kiev *MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 53 No 4, Jul-Aug 91* (manuscript received 14 Jan 91) pp 85-90

[Article by O. A. Kushnirenko, G. V. Baranova and V. G. Krayev, Institute of Microbiology and Virology, Ukrainian SSR Academy of Sciences, Kiev; UDC 578.863.1.23

[Abstract] Isolation and purification were analyzed in order to determine the optimum method for the isolation and purification of membrane-bound RNA replicase (RR) from apple thorn (*Datura*) infected with potato virus X. The technical steps involved ammonium sulfate precipitation of the cellular extract, concentration on polyethylene glycol (PEG-6000), and column chromatography on DEAE cellulose DE-52 and phosphocellulose P-II. The resultant product consisted of 173X purified protein fraction with RR activity concentrated in two major protein components: 180 and 115-120 KD, the latter exhibiting higher specific activity. Figures 3; tables 1; references 9: 1 Russian, 8 Western.

**Microbial Treatment of Oil-Polluted Waste Waters**

927C0238D Kiev *MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 53 No 4, Jul-Aug 91* (manuscript received 04 May 90) pp 91-95

[Article by N. I. Pavlenko, V. V. Izzheurova, L. M. Khenkina, T. N. Karpova and L. V. Golovko, Institute of Bioorganic Chemistry and Petrochemistry, Ukrainian SSR Academy of Sciences, Kiev; UDC 575.095.3:628.35

[Abstract] An assessment was conducted on the efficiency of free and immobilized pure microbial cultures and associations in oxidizing petroleum products, using cultures isolated from waters at the Lisichansk refinery. Preliminary studies showed that capron threads ensured optimum immobilization (94.7-96.8 percent) of both pure and associate cultures after a few hours of incubation. The oil oxidizing potential of free cultures was on the order of 0.21 to 0.50 day<sup>-1</sup>, while that of immobilized cultures was 0.95 day<sup>-1</sup>. In addition, immobilized microbial associations were more efficient than immobilized pure cultures in decomposition of the petroleum products with respective  $T_{1/2}$  values of 0.7-1.0 and 1.2-1.6 days. Tables 3; references 21: 15 Russian, 6 Western.

### Degradation of Internal Concrete and Reinforced Concrete Surfaces by Micromycetes at Food Industry Facilities

927C0238E Kiev MIKROBIOLOGICHESKIY ZHURNAL in Russian Vol 53 No 4, Jul-Aug 91 (manuscript received 28 Nov 90) pp 96-103

[Article by E. Z. Koval, V. A. Serebrenik, Ye. L. Roginskaya and F. M. Ivanov, Institute of Microbiology and Virology, USSR Academy of Sciences, Kiev; Scientific Research Institute of Concrete and Ferroconcrete Engineering and Technology, USSR State Construction Committee (Gosstroy), Moscow; UDC 579.222

[Abstract] Analysis of samples obtained from internal concrete and reinforced concrete surfaces at a bakery and a meat plant in Moscow led to the isolation and identification of 23 species of micromycetes, largely represented by Deuteromycetes. The most common isolates were *Aspergillus flavus*, *A. niger*, *Paecilomyces varioti*, *Cladosporium cladosporioides* and *Penicillium expansum*. Surface destruction, reaching five to 10 mm as a result of carbonation, was due to production of acidic metabolites and carbon dioxide by the mycotic contaminants. Figures 5; tables 3; references 14: Russian.

### Forming Acetate From Hydrogen and Carbon Dioxide With the Thermophilic Homoacetic Bacterium *Acetogenium kivui*

927C0295A Moscow MIKROBIOLOGIYA in Russian Vol 60 No 4, Jul-Aug 91 (manuscript received 5 Jul 90) pp 616-621

[Article by M. A. Pusheva, Ye. I. Raynina, N. P. Borodulina, A. M. Ryabokon, T. A. Makhlis, and O. R. Kotsyurbenko, Institute of Microbiology, USSR Academy of Sciences, Moscow; UDC 579.841.92.017.7

[Abstract] Until recently, the study of acetate synthesis by homoacetic bacteria has been limited to organotrophic cultures. In both batch and continuous cultivation of those bacteria from gas substrates, acetate production is slow and small. That makes it urgent for biotechnology to create biocatalytic systems for producing acetate through the conversion of  $H_2$  and  $CO_2$  on the basis of immobilized bacterial cells. The researchers here chose to study acetate synthesis in batch cultivation, cell suspensions, and by immobilized DSN 2030 *Acetogenium kivui* cells. In batch cultivation under pH-controlled conditions, the bacteria was found to synthesize acetate at a rate of 0.5 g/l culture per hour. The final concentration of the acetate was 170 mM, or 104 g/l. The maximum rate of the use of hydrogen was 3.02 mol/g protein per hour, with the rate of absorption greatest in the initial exponential growth phase. The coefficient of the stoichiometry of the transformation of hydrogen into acetate was 0.20, or 80 percent of the theoretically maximum value. Both growth-dependent and independent synthesis were observed by the researchers. In using a polyvinyl alcohol cryogel to create a biocatalyst, they

found that the catalyst they obtained was easily synthesized and had mechanical strength at 65°. The immobilized cells were found to be capable of producing acetic acid for a year or longer. Figures 6, references 12: 3 Russian, 9 Western.

### Effect of Pumping Aerated Solutions of Mineral Salts on the Microflora of the Water of Critical Zones of Petroleum Deposit Injection Wells

927C0295B Moscow MIKROBIOLOGIYA in Russian Vol 60 No 4, Jul-Aug 91 (manuscript received 5 Apr 89) pp 741-746

[Article by A. Z. Gareyshina, T. A. Kuznetsova, S. I. Ostrobokova, K. A. Mamakov, R. S. Giniyatullin, and Yu. V. Kochetkov, All-Union Scientific Research Institute for the Chemicalization of Engineering Processes in the Petroleum Industry, Kazan; UDC 550.72:579.8.017.6(470.41)

[Abstract] In a study of the response of the microflora of the critical zone of injection wells to the pumping of aerated solutions of salts of nitrogen and phosphorus ( $NH_4Cl$  and  $Na_2HPO_4$ ), the researchers centered their attention on three sectors of the Romashkinskiy deposit in Tatariya. The productive horizons of the deposit are primarily Devonian sandstone and aleurolites, with an average porosity of 18-20 percent and a permeability of 0.270-0.590  $\mu^2$ . Mineralization of the pumped water was no greater than 2.8 g/l, and  $SO_4^{2-}$  content was 0.10-0.23 g/l. Sector one contained two injection wells and 14 recovery wells; sector two, one injection well and four recovery wells; sector three, one injection well and three recovery wells. The sectors had all been in use for at least a year, with fresh water used for the flooding, as a result of which the critical zones of the injection wells were the locus of communities of aerobic hydrocarbon-oxidizing microorganisms and anaerobic bacteria. The mineral salt solutions were found to activate the deposit microflora, as evidenced by a substantial growth in microorganism populations that grow on meat-peptone agar, methane-forming bacteria, and denitrifying bacteria. Figures 4, references 7: Russian.

### Hydrocarbon-Oxidizing Microflora of Flooded Petroleum Deposits of Tatariya With Varying Mineralization of the Deposit Water

927C0295C Moscow MIKROBIOLOGIYA in Russian Vol 60 No 4, Jul-Aug 91 (manuscript received 14 May 90) pp 747-756

[Article by Ye. I. Milekhina, I. A. Borzenkov, Yu. M. Miller, S. S. Belyayev, and M. V. Ivanov, Institute of Microbiology, USSR Academy of Sciences, Moscow; UDC 579.8.017.7:550.72(470.41)

[Abstract] Focusing on the propagation of aerobic microorganisms in flooded terrigenous petroleum collectors with deposit water of varying levels of mineralization, the researchers here performed field studies at the

Bondyuzhskiy and Romashinskiy petroleum deposits in the Tatar ASSR. Sterile samples were taken from injection and recovery wells and analyzed with standard hydrochemical techniques that used Aqua Merck test kits. The largest populations (as high as  $1.3 \times 10^5$  cells/ml) were found in the critical zones of injection wells. The researchers concluded that fresh-water flooding of the deposits brought with it a substantial amount of hydrocarbon-oxidizing microorganisms. In

deposit water with a mineralization of 6-272 g/l, the population of such bacteria dropped to 1-25 cell/ml. Samples taken from the recovery wells revealed that the hydrocarbon-oxidizing microorganisms are concentrated primarily in petroleum, with content two to three orders of magnitude greater than in water. The researchers isolated and described organic compounds on media containing 0.15-25 percent NaCl. Figures 4, references 16: 11 Russian, 5 Western.



**Modern Immunocorrectors in Modeling Thymic Dysfunction in Guinea Pigs**

927C0286C *Baku IZVESTIYA AKADEMII NAUK  
AZERBAYDZHANSKOY SSR: SERIYA  
BIOLOGICHESKIKH NAUK in Russian No 1,  
Jan-Feb 91 pp 110-113*

[Article by M. G. Aliyev, Sh. G. Guseynov and T. G. Kurbanov, Institute of Physiology imeni A. I. Karayev, Azerbaijan SSR Academy of Sciences; UDC 612.421.45+616.438+008.547.96]

[Abstract] Biological response modifiers isolated from bone marrow and thymus were tested for potential suitability in correcting thymic dysfunction. The experimental model consisted of male and female 210-240 g guinea pigs injected intramuscularly with the following:

thymalin (isolated from thymus), hemalin (isolated from bone marrow), thymohemin (combined immunomodulator from thymus and bone marrow), and synthetic thymalin. The agents were administered in doses of 0.02-0.3 mg/kg for 10 days. The net findings were that administration of 0.025 mg/kg of thymalin, thymohemin and hemalin resulted in significant gain in thymic weight, while ten-fold greater doses led to involution. The inverse findings prevailed vis-a-vis adrenal glands. In addition, while thymalin and thymohemin preferentially stimulated T cells, the effects of hemalin were limited to stimulation of B cells. On balance, these observations indicate that the immunomodulators in question may have potential applications in management of thymic hypo- and hyperplasia. Tables 4; references 14: 9 Russian, 5 Western.

**Ultrastructural Changes in Rat Brain Tissue in Response to Direct Effect of *Escherichia coli* Endotoxin**

927C0183A Kiev *FIZIOLOGICHESKIY ZHURNAL* in Russian Vol 37 No 5, Sep-Oct 91 (manuscript received 28 Nov 90) pp 41-46

[Article by E. A. Bardakhchyan and N. G. Kharlanova, Rostov Order of People's Friendship Medical Institute, RSFSR Ministry of Public Health; UDC 576.8.097:611.81:616-076.4]

[Abstract] The objective of this investigation was to study the direct effect of *Escherichia coli* endotoxin on the ultrastructure of cerebral nerve elements after the intracisternal injection of lipopolysaccharides (4.5 mg/kg) and to explain the effect of lipopolysaccharides on the ependymal layer and the epithelium of the vascular plexi of the lateral ventricles in the brain when the toxin passes through the brain-liquor and blood-liquor barriers. The experiments were performed on 14 male rats (180-200 g) administered an intracisternal injection of approximately 10 µl of physiological solution with *E. coli* endotoxin. Results of control experiments showed no structural alterations. However, distinct alterations were noted in the experimental group in the form of cellular edema and polarization of the organelles and nucleus 30 min after contact between the endotoxin and ependymocytes. Contact of the lipopolysaccharides with the apical plasmalemma results in destruction of the microvilli and cilia and subsequent labilization of the plasmalemma. Five hours after the beginning of the experiment radical dystrophic changes are found in the central grey matter neurons. Accordingly, these results show that the transport mechanisms depend on the type of cell in question. Furthermore, shunting from transcellular to intracellular transport makes it possible to circumvent dense formations of ciliary ependymocytes and deliver the endotoxin from the cerebrospinal fluid to the brain structures. It was also shown that receptor-mediated endocytosis is sharply activated in epithelial cells of the vascular plexus, like in neurons. Finally, ultrastructural alterations in the ependyma and vascular plexi in response to the intracisternal administration of endotoxin are destructive. Also, substantial differences between the mechanisms of endotoxin penetration through the blood-liquor and brain-liquor barriers were identified. Figures 4; references 15: 10 Russian, 5 Western.

**Hyperbaric Oxygenation in Comprehensive Treatment of Rheumatoid Arthritis Patients (Clinical and Immunological Investigation)**

927C0183B Kiev *FIZIOLOGICHESKIY ZHURNAL* in Russian Vol 37 No 5, Sep-Oct 91 (manuscript received 29 Dec 90) pp 55-60

[Article by V. L. Lukich, L. V. Polyakova, T. I. Sotnikova, and D. V. Belokrinitskiy, Moscow Medical Academy imeni I. I. Sechenov, USSR Ministry of Public Health; UDC 615.835.3-616.72-002:57.083.3]

[Abstract] The effect of a course of hyperbaric oxygenation on the immune status was investigated in 35 of 50 rheumatoid arthritis patients (average age 49.3 years, suffering from the disease for an average of 8.67 years) for whom long-term traditional therapy with non-steroid anti-inflammatory preparations and basic remedies had little effect. Researchers began a hyperbaric oxygenation course consisting of 12 sessions, 40 min each, at 167 kPa against this background of treatment. After five to six sessions many noted that morning problems were shorter and less-pronounced. Joint pain lessened by the tenth to twelfth treatments. The results of rheumatoid arthritis patient immune status investigations showed that oxygen at increased pressures affects the immune system and reflects one of the facets of this method of treatment on the pathological process. In addition, clinical and immunological results show that including hyperbaric oxygenation in the comprehensive therapy of rheumatoid arthritis patients has a positive effect, decreasing the expression of joint syndrome and the manifestations of systemic affliction. The results also suggest a trend towards normalization of indexes of cellular immunity with suppression of helper and enhancement of suppressor activity of T-cells noted in comprehensive treatment with the use of hyperbaric oxygenation. Moreover, the immunostimulating function of hyperbaric oxygenation is particularly distinctly expressed in rheumatoid arthritis patients with systemic manifestations. In addition, hyperbaric oxygenation treatment elicited a decrease in the circulating immune complexes. Tables 4; references 15: 8 Russian, 7 Western.

**Lung-Specific Antibodies for Directed Changes in Surfactant Activity in Rat Lung**

927C0183C Kiev *FIZIOLOGICHESKIY ZHURNAL* in Russian Vol 37 No 5, Sep-Oct 91 (manuscript received 11 Aug 90) pp 66-70

[Article by V. A. Berezovskiy, V. Yu. Gorchakov, I. N. Alekseyeva, Ye. O. Bogomolets, I. V. Andrianova, and N. V. Makogon, Oncology Institute imeni R. Ye. Kavetskiy, Ukrainian SSR Academy of Sciences, Kiev; UDC 612.215.1/5]

[Abstract] The effect of different doses of specific antibodies on the surface activity of surfactants and the ultrastructure of respiratory sections of the lung was investigated using 216 Wistar rats (150-200 g). In the first series of experiments the rats were administered a gamma-globulin fraction of anti-surfactant serum (GAS) five days in a row into the caudal vein in a dose of 3 mg/100 g. The second series of rats received three injections at two-day intervals in a dose of 0.06 µg/100 g. The large doses of GAS decreased the surface activity of surfactants in the lung and did not affect the stability index. However, small doses of GAS decreased the minimal surface tension by only 22 percent while increasing the stability index by 39 percent. These results suggest that specific antibodies used in large doses decrease the surface activity of lung surfactants and that

low doses stimulate the lung surfactant system. Furthermore, electron microscopy data suggested that GAS in large doses amplifies the destruction of pulmonary cellular elements and increases the functional activity of cells that secrete surfactants. The different effects of large and small doses of antibodies to lung surfactant support a general mechanism of the effect of different doses of anti-tissue antibodies. In conclusion, specific antibodies are an active factor that affect the properties of lung surfactants and the functional activity of cells that synthesize it. The data also show that low doses of anti-surfactant antibodies can be used to stimulate the surface activity of lung surfactants. Tables 1; references 18: 13 Russian, 5 Western.

### Protective Effect of Malonic Acid in Hypoxic Hypoxia

927C0183D Kiev FIZIOLOGICHESKIY ZHURNAL  
in Russian Vol 37 No 5, Sep-Oct 91 pp 111-112

[Article by V. V. Davydov and A. V. Repetskaya, Zaporozhnyy Medical Institute, Ukrainian SSR Ministry of Public Health; UDC 616.273.2:547.461.3

[Abstract] The effect of malonic acid on the resistance of mice to acute hypoxic hypoxia was investigated in 70 male Wistar rats (180-200 g) since it is believed that malonic acid may be an important factor in regulating metabolism, particularly when the body is subjected to extreme factors. The rats were injected with a neutral solution of malonic acid intraperitoneally in doses of 10 or 100 mg/200 g. Thirty minutes later they were placed in a altitude chamber set at 12,000 m. After apnea developed the life span was calculated. The results demonstrated that malonic acid displayed a pronounced protective effect in the rats under conditions of acute hypoxic hypoxia, suggesting that it may be of certain adaptive significance. However, the specific mechanism of the protective effect against hypoxia and the pathway of its effect on metabolism remains vague. Figures 1; references 4: 1 Russian, 3 Western.

### Humoral Factors of Spleen in Regulating Blood Plasma Level of Calcium in Rats

927C0183E Kiev FIZIOLOGICHESKIY ZHURNAL  
in Russian Vol 37 No 5, Sep-Oct 91 (manuscript received 11 Jun 89) pp 113-116

[Article by V. V. Korpachev and N. M. Doroshenko, Kiev Endocrinology and Metabolism Institute, Ukrainian SSR Ministry of Public Health; UDC 612.414.82:612.115.32

[Abstract] The objective of this investigation was to determine how the administration of different doses of peptide-enriched spleen extract affects the blood plasma level of calcium and determine whether experimental enhancement of spleen function elicits a similar response in 184 male Wistar rats (170-220 g). The first series of experiments investigated the effect of protein-free spleen extract from

cattle on the blood plasma level of calcium. In the second series of experiments the animals were given intraperitoneal injections twice weekly of a 2.5 percent solution of methyl cellulose (2.0 ml) to induce splenic hyperfunction. According to spectrofluorometric data, the most marked increase in the calcium concentration in the blood plasma was observed in experimental hypersplenism. It is believed that there are two factors in the spleen that can affect the calcium concentration in the blood plasma. One is found in the pharmacopeial preparation splenin [as published]; the other is found in the protein-free spleen extract. The results demonstrated that the significant increase in the plasma concentration in response to spleen extract administration and hypersplenism is explained by the ability of spleen factors to stabilize cell membranes and prevent calcium from entering the cytoplasm. Figures 1; tables 1; references 13: 11 Russian, 2 Western.

### Neurochemical Modulation of Aggression and Submission

927C0215A Moscow ZHURNAL VYSSHEY  
NERVNOY DEYATELNOSTI IMENI I.P. PAVLOV  
in Russian Vol 41 No 3, May-Jun 91 (manuscript received 25 Dec 89; in final form 21 Mar 90)  
pp 459-466

[Article by N. N. Kudryavtseva and I. V. Bakshantovskaya, Institute of Cytology and Genetics, Siberian Department, USSR Academy of Sciences, Novosibirsk; UDC 612.821.6+615.78

[Abstract] An analysis was conducted on neurochemical correlates of aggressive and submissive behavior in male mice using the sensory contact model. The results showed that both specific and nonspecific changes were evident in neurotransmitters in the various brain formations. In comparison with control mice, aggression correlated with elevated hippocampal levels of norepinephrine (NE), elevation of 3,4-dihydroxyphenyl acetic acid (DHPAA) in the olfactory bulbs (OB) and hippocampus, and of DHPAA/dopamine ratios in the amygdala, hippocampus and the nucleus accumbens septi (NAS). Submission was characterized by depression of NE in the OB and NAS and of GABA in the midbrain; serotonin and 5-hydroxyindole acetic acid (HIAA) were elevated in the OB and the HIAA/serotonin ratios were elevated in the OB and hippocampus. Consequently, aggression involved activation of serotonergic mechanisms and submissive behavior entailed changes largely in dopaminergic mechanisms, while reversal from aggressive to submissive behavior after a seven day string of "victories" and vice versa involved attenuation of the respective factors. Figures 2; references 16: 8 Russian, 8 Western.

### Enhancement of Hypothalamic Levels of Substance P (SP) and Stress Tolerance in Rats by Delta Sleep-Inducing Peptide (DSIP)

927C0215B Moscow ZHURNAL VYSSHEY  
NERVNOY DEYATELNOSTI IMENI I.P. PAVLOV  
in Russian Vol 41 No 3, May-Jun 91 (manuscript received 11 Jul 90; in final form 31 Oct 90) pp 558-563

[Article by R. M. Saliyeva, K. Yanovskiy [as published], R. Ratsak [as published], Ya.I. Trofimova, P. Oyeme

(Oehme), K. V. Sudakov and Ye. A. Yumatov, Institute of Normal Physiology imeni P. K. Anokhin, USSR Academy of Medical Sciences, Moscow; Institute of Biologically Active Substances, GDR Academy of Sciences, Berlin; UDC 612.8.015+612.821.6+ 612.821.7+ 612.822.3

[Abstract] Involvement of DSIP and SP in stress tolerance led to an assessment on the impact of exogenous DSIP on hypothalamic SP in control rats and animals differing in tolerance of tail-fixation stress. Trials on 200-250 g male August rats demonstrated that intraperitoneal administration of 60 or 120 nmoles/kg resulted in a significant dose-dependent increase in hypothalamic levels of SP: from a 98.4 pg/g baseline to 135.5-137.4 pg/g after six h. Five-day (five h/day) stress depressed hypothalamic SP concentrations to an extent depending on predisposition, while daily pretreatment with DSIP prior to stressing counteracted the effect of stress and promoted an increase in SP. In addition, a single pretreatment with 60 nmoles/kg of DSIP limited stress-induced adrenal weight gain to 8 percent (vs. 29 percent in untreated rats) and thymic atrophy to 34.14 percent (vs. 67.52 percent). Accordingly, these observations indicate that the stress-limiting properties of DSIP are mediated via hypothalamic SP. Figures 2; tables 3; references 11: 9 Russian, 2 Western.

#### **Nociceptive Individuality in Wistar Rats and Plasma Steroid Hormones**

927C0215C Moscow ZHURNAL VYSSHEY NERVNOY DEYATELNOSTI IMENI I.P. PAVLOV in Russian Vol 41 No 3, May-Jun 91 (manuscript received 18 Jan 90; in final form 04 Jul 90) pp 564-572

[Article by Yu. V. Polyntsev, Ye. V. Bykova, Ye. L. Rogatina and Yu. N. Samko, Institute of Normal Physiology imeni P. K. Anokhin, USSR Academy of Medical Sciences, Moscow; UDC 612.821.6+577.17

[Abstract] Tail-flick studies on 150-200 g male Wistar rats in response to painful stimuli (thermal and tip amputation) were correlated with plasma corticosterone (CS) and testosterone (TS) levels in order to identify putative predictive indicators. Rats with the highest levels of plasma CS were shown to be most refractory to pain, an observation attributed to rapid anticipatory secretion of CS prior to actual stress. Presumably, the high circulating levels of CS were responsible for the relative analgesia. In addition, these animals also displayed highest levels of TS after stress, whereas in the less pain-tolerant animals TS levels fell after stress. Accordingly, these findings indicate that levels of CS when the animal is faced with a testing situation may serve as an indicator of pain tolerance. Figures 3; tables 1; references 8: 6 Russian, 2 Western.

#### **Extracellular Amygdaloid Levels of Dopamine, Dopamine Metabolites and 5-Hydroxyindole Acetic Acid (5-HAA) in Unrestrained Rats During Mouse Killing**

927C0215D Moscow ZHURNAL VYSSHEY NERVNOY DEYATELNOSTI IMENI I.P. PAVLOV in Russian Vol 41 No 3, May-Jun 91 (manuscript received 24 Jul 90; in final form 09 Jan 91) pp 584-586

[Article by R. R. Gaynetdinov, A. I. Gromov and V. S. Kudrin, Institute of Pharmacology and of Normal Physiology imeni P. K. Anokhin, USSR Academy of Medical Sciences, Moscow; UDC 591.513+615.78

[Abstract] Amygdala perfusion studies on > 300 g outbred male rats were used to monitor dopamine and serotonin metabolism during mouse killing. Dopamine, dioxyphenyl acetic acid and homovanilic acid levels rose 2- to 2.5-fold in the act of killing, thereafter returning to baseline with the exception of homovanilic acid which remained elevated. 5-Hydroxyindole acetic acid rose gradually and continued to rise after the episode of killing. These observations indicate that amygdaloid involvement in interspecies aggression involves enhanced dopamine release from nerve endings, followed by activation of serotonergic mechanism during relaxation phase. Tables 1; references 5: 4 Russian, 1 Western.

#### **Hemodynamic Aspects of Hypotensive Action of Cobalt in Anesthetized Rats**

927C0225D Moscow KARDIOLOGIYA in Russian Vol 31 No 6, Jun 91 (manuscript received 16 Oct 90) pp 80-82

[Article by S. F. Dugin, N. V. Zakharova and O. S. Medvedeva, Institute of Experimental Cardiology, All-Union Cardiological Scientific Center, USSR Academy of Medical Sciences, Moscow; UDC 615.31:546.73]. 036.8:616.12-008.331.1-08-092.9

[Abstract] An analysis was conducted on the hemodynamic effects elicited by Co ions with and without modulation by propranolol or verapamil in pentobarbital anesthetized (40-50 mg/kg; i.p.) 360 g male Wistar rats. In one series of experiments the animals received bolus injections of 30, 90, 270 or 810 µg/kg of Co<sup>++</sup> before or in conjunction with propranolol- (2 mg/kg) or verapamil- (400 µg/kg) pretreatment; in another series Co<sup>++</sup> infusion (55 or 85 µg/kg/min) was employed. Interpretation of the resultant findings was consistent with the view that Co ion-induced hypotension is primarily realized via Ca channels and is due to regional vasodilation (skin, bronchi, kidneys). Cobalt cardiotoxicity—evident at high doses in the form of elevated left ventricular pressure atrioventricular blockade, and ventricular fibrillation—was prevented by verapamil. Tables 3; references 4: 2 Russian, 2 Western.

### Reversal of Fentanyl-Induced Respiratory Depression by Naloxone and Nalbuphine

927C0216A Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK in Russian No 7, Jul 91 (manuscript received 19 Dec 90) pp 13-17

[Article by A. A. Bunyatyan, N. A. Trekova, D. K. Ter-Mikayelyan, Ye. M. Miyezbekov and Ye. T. Asmagulyan, All-Union Scientific Center for Surgery, USSR Academy of Sciences, Moscow, and Yerevan Branch of the Center; UDC615.214.31.015.23.07

[Abstract] Clinical trials were conducted with naloxone and nalbuphine to assess their efficacy in reversing fentanyl-induced respiratory depression in patients recovering from anesthesia in general and heart surgery. The cohort involved 59 patients, two to 65 years old. Physiological monitoring showed that administration of 0.1-0.3 mg of naloxone (0.05-0.1 mg/1-2 min; bolus or dropwise infusion) eliminated CNS depression in 100 percent of the cases with full recovery of respiratory function in five to 10 min. Fifty percent recovered with full awareness of their surroundings, while 35 percent showed partial awareness. However, all patients with bolus administration complained of sharp pain and 63.2 percent had 25-35 mmHg hypertension, while 30 percent of those receiving naloxone as a dropwise infusion remained free of pain. Bolus administration of 0.12-0.3 mg/kg of nalbuphine led to full respiratory recovery in 88 percent of the patients in 20 min (vs. 38.8 percent in non-nalbuphine controls;  $p < 0.001$ ). Early consciousness was evident in 76 percent of the general surgery patients and in 53.3 percent of the heart surgery cases, and 80 percent remained free of pain. Finally, hypertensive sequelae were noted in 45.8 percent of the general cases and 66.6 percent of the cardiac patients. On balance, these findings demonstrated that post-anesthetic respiratory recovery can benefit from naloxone and nalbuphine administration during recovery from fentanyl anesthesia, and that the latter agent presents better clinical indications for use. Figures 3; tables 4; references 18: 1 Russian, 17 Western.

### Small Regulatory Peptides in Anesthesiology

927C0216B Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK in Russian No 7, Jul 91 (manuscript received 23 Oct 90) pp 17-21

[Article by V. V. Likhvantsev and V. I. Smirnova, Institute of Surgery imeni A. V. Vishnevskiy, USSR Academy of Medical Sciences, Moscow; UDC 617-089.5-031.81:615.212.7:[547.95:547.943]-07+615.212.7:[547.95:547.943].03

[Abstract] Trials were conducted on the use of dalargin, a synthetic Soviet analog of leu-enkephalin, in heart surgery in order to test its efficacy in alleviating the surgical and anesthetic-induced stress. The study involved 330 patients medicated with dalargin infusion (45-55 mg/kg/h) with intraoperative vital function monitoring and stress assessment. The overall impression

was that dalargin was of signal benefit in alleviating stress and postoperative respiratory distress as indicated by the monitoring data, including EEG studies and blood levels of ACTH, cortisol and  $\beta$ -endorphin. For example, in radical surgery for tetralogy of Fallot combination of intra- and postoperative dalargin infusion resulted in a 27 percent reduction in respiratory complications. In particular, the findings demonstrated that dalargin was highly beneficial in protecting the lungs, liver and pancreas and can be regarded as a universal cytoprotector. Finally, the use of dalargin also made possible lower doses of anesthetics, including reduction in the rate of fentanyl infusion from 9.84 to 2.08  $\mu\text{g/kg/h}$ . Figures 4; tables 2; references 17: Russian.

### Drug Shortages Persist Despite Price Increases

927C0251A Moscow ROSSIYSKAYA GAZETA in Russian 9 Jan 92 p 6

[Article by Lyudmila Dianova: "Moscow. January. The Pharmacy"]

[Text] A bell sounded, and the pharmacist courteously appeared at the door to greet the next visitor. He carefully analyzed the problem of his client, and his entire appearance gave off the impression that he was ready to help. That is how it was, but will it be that way once again?

The flu is currently raging in Moscow, putting hundreds of people in bed daily, but the pharmacies are unusually empty. Compare this with the days just before the new year, when price increases on medicines were announced on television, and the crowds around the pharmacy shelves were impenetrable. Prudent elderly women who had learned to stock up on whatever happened to be in short supply were stocking up on medicines. Enough for a month or two. And after that, who knows?

Prices on all drugs without exception were increased fourfold. From all appearances retired persons suffering an entire "bouquet of diseases" will have to make a choice: either medicine or bread.

Moscow's pharmacies carry a fabulous drug effective against stomach ulcers—De-Nol. Before the price increase it cost 17 rubles a package, and now it costs 68. And undergoing a course of De-Nol treatment requires paying for a minimum of three packages, which will cost our patient a little over R200.

Pharmacists standing behind their windows give the same warning to customers over and over: The prices of drugs have risen significantly.

"That is all right, dear," an old lady rejoices on learning that life-saving valokordin is still for sale. "The value of health is higher."

But this is a rare success story, one that still repeats itself in central pharmacies. In the "bedroom" rayons of Moscow, however, things are just as they were before

liberalization of prices: You cannot find either bandaging or *zelenka* antiseptic. This is despite the fact that not that long ago, a pharmacy director could have been simply dismissed from his post for running out of this renowned antiseptic.

In those days, pharmacists worked in makeshift, cramped quarters filled with medicines. Though of course, it was hard to get contraceptives then. Today you can find them in any pharmacy, but the prices, the prices....

I know, there are some who might object: Look at the West, they say, the prices there are astronomical as well. However, this is only in absolute terms. They are fully accessible to the rich, while people of modest means enjoy significant advantages. Charitable organizations and Red Cross departments pick up part of their load.

Nonetheless, for the sake of justice I must say that the shelves in the pharmacies are not as empty as those in food stores. Some medicines are available, though for the most part these are new, little-known drugs. Hardly anyone buys them (even though many of them have been proven to be highly effective). The greatest demand is still for the old, tested resources—analgin, aspirin, valokordin. These unfortunately are unavailable—to the overwhelming majority.

With things being as bad as they are, pharmacists are trying to help the least-protected social groups—disabled persons and children. For them, the pharmacies maintain that cherished cabinet containing a reserve of medicines in short supply, which are dispensed free of charge, as before. But retired VIP's have lost their drug subsidy, and they will no longer enjoy the 20 percent discount.

Many chronic patients have been using the same drug for several years. If it is Soviet-made, there is still some hope of obtaining it. But what if it is imported? How will things stand this year with purchases abroad?

S. Odintsova, deputy general director of the Moscow City Department of "Farmatsiya," did not offer any encouragement in her answer: "Funding is still unavailable this year."

But the following information might be reassuring. Because the list of new prices was not ready by the new year, prices were raised on all medicines automatically, and they will probably be reviewed in the immediate future, such that approximately 300-400 different medicines will become cheaper.

It is difficult to say at the moment precisely what medicines will "receive amnesty," but you must agree that prior to the liberalization, some prices on medicinal preparations were purely symbolic.

Is five kopecks all that 10 mustard plasters should really cost? And what about the mixtures and drops? Sometimes we paid two or three kopecks for them. They cost us practically nothing, and all we paid for was the vial.

What is remarkable is that the manual labor of the pharmacist was not included in the cost of medicine prepared in the pharmacy, nor is it included today, and this is extremely responsible and laborious work, upon which the life of the patient depends directly. Consequently what we need is a sensible balance of drug prices, and I mean sensible!

Today, the pharmacies are as unprofitable as they were before. The fourfold increase in prices cannot radically change the pharmaceutical situation. Unfortunately pharmacies do not fit into a market economy. Pharmacy workers are not taking proposals on privatization seriously. Where are they to get the money, when pharmacists have always received chicken feed for their labor? Even now, by the way, their wages are among the lowest.

### Official Public Health Statistics

927C0254A Moscow VESTNIK STATISTIKI  
in Russian No 11, Nov 91 pp 57-61

[Article: "Health Care Services to the Population"]

[Text] The expenses of public health and physical culture covered by assets from the budget and from state, cooperative and public enterprises and organizations in 1986-1990 increased by over a time and a half, and they are characterized by the following data (billions of rubles):

Table 1.

	1985	1989	1990
Total Expenses	22.5	33.6	36.0
Including from the budget	17.6	24.6	28.4
Public health alone	17.5	24.4	28.2
Percent of Gross National Product	3.0	3.6	3.6

The proportion of public health expenses in the gross national product is 10.4 percent for the USA, 8.7 percent for France, 8.1 percent for the FRG, 6.2 percent for Italy, 6.5 percent for Japan and 5.9 percent for Great Britain.

The mean annual growth rate of the expenses of public health and physical culture was 9.9 percent in the last five years, as compared to 3.5 percent in 1981-1985.

The indicated increase in expenditures is associated to a significant extent with the fact that since 1988 the standards for outlays on food for patients and for the acquisition of medicines, equipment and inventory for medical institutions were increased, dispensing drugs to children up to three years old free of charge was instituted, and a number of other measures were implemented to improve public health. In particular the standards for outlays on food increased in 1990 by an

average of 30 percent, while outlays on the acquisition of medicines increased by 50 percent. New salaries for public health workers were introduced as of November 1987. As a result the average wages of physicians increased by 28 percent; in 1990 they increased by 13 percent, and by the beginning of 1991 they totaled R275 (the average for the national economy is R274.6).

Over half of the structure of all public health expenses consists of wages, while capital investments and acquisition of equipment and inventory represent 16 percent.

Despite the increase in expenses, significant changes did not occur in the status of health care support to the population in the last five years, with the situation worsening in a number of cases. As in 1985, in 1990 over 1 billion man-days were lost in the national economy in connection with diseases, injuries and patient care (primarily children). This is equivalent to a daily absenteeism from the work place of approximately 4 million persons, or 3 percent of the total number employed in the national economy. Morbidity involving temporary incapacitation increased in most republics in 1986-1990, and especially in Moldova, Belarus and Lithuania, where it increased by 10-19 percent (it increased by 0.7 percent in the country as a whole).

In 1990, 164 million cases of disease were registered among persons visiting therapeutic institutions, to include 84 million—or 294 per 1,000 people—cases of respiratory disease, 19 million (68) cases of injury and poisoning, 12 million (42) cases of nervous system and sensory organ disease, 9 million (32) cases of skin disease, 8 million (27) cases of digestive tract disease and 6 million (21) cases of disease of the bone and muscle system and other chronic illnesses.

The highest morbidity indicators for circulatory organs are noted in the Ukraine, Estonia and Latvia—2,225-1,281, digestive organs—in Moldova, Uzbekistan, Armenia and Georgia—3,070-6,813 illnesses per 100,000 population.

Among persons with diseases of the endocrine system (over 1 million), almost one out of every four suffers sugar diabetes. These indicators vary regionally from 127-147 persons per 100,000 population in Estonia, Armenia and the Ukraine to 44-46 in Tajikistan and Uzbekistan.

In 1990, 300,000 patients with mental disorders, or 105 per 100,000 population, with one out of every two suffering nonpsychotic mental disorders, and approximately one out of every four with mental retardation. Moreover 372,000 persons were placed under consultative observation. The highest morbidity indicators for mental disorders remain in Moldova where they are 13 percent above the all-union level, in Latvia where they are 25 percent above, and in the Ukraine where they are 31 percent above.

Alcoholism is widespread in Moldova, Latvia, the Ukraine and the RSFSR: 127-152 cases per 100,000

population, as compared to a country average of 123. Concurrently with a decrease in alcoholism morbidity, the incidence of drug addiction and toxic substance abuse increased noticeably—by 1.4 times, except in the Ukraine and Turkmenistan, where it decreased, but where its level continues to be the highest, exceeding the average union indicator by 1.6 times. As of the beginning of 1991 over 4 million alcoholics and drug addicts were on record at therapeutic and preventive institutions (1,450 per 100,000 population), and around 1 million persons were registered for treatment in connection with abuse of alcohol and of narcotic and non-narcotic substances.

In the last five years the incidence of tuberculosis increased in Uzbekistan, Kirghizstan and Turkmenistan, with the increase being especially large, by a third, in Turkmenistan. The incidence of its most dangerous form—bacillar—is not decreasing. This is being promoted in particular by insufficiently active efforts to isolate patients suffering tuberculosis of respiratory organs and tested positive for mycobacteria. Thus, in 1990 a little more than 40 percent of patients living in dormitories were isolated in separate rooms, and only a third of patients were removed from crowded apartments in which children lived as well. Of the total number of patients diagnosed with tuberculosis for the first time, two-thirds are men, with 61 percent of them being from 18 to 50 years old. The highest incidence of active tuberculosis remains, as in previous years, in Kazakhstan—65.8 per 100,000 population (the country average is 36.9). Tuberculosis morbidity in the country as a whole exceeds the corresponding indicators of developed countries by two to 10 times.

The incidence of malignant neoplasms is high, especially in the Ukraine, Kazakhstan and Estonia, where it is 6-18 percent above the union average. The proportion of patients revealed with neglected illness is increasing: In 1990 the proportion of such patients in the country as a whole was 22 percent (19 percent in 1980, 21 percent in 1987), while in Uzbekistan, Estonia and Turkmenistan it was 26-33 percent. In these same republics and in Kirghizstan there is a large proportion of persons who died not less than one year from the moment of establishment of the diagnosis—67-75 percent (the country average is 55 percent). The reasons for this are that hospitals do not have enough modern medical equipment, physicians of the general therapeutic network are not alert to oncological disease, and in a number of cases their qualifications are low.

The incidence of infectious diseases is growing in certain regions of the country. In comparison with 1985, in 1990 the incidence of acute intestinal infections increased in Latvia by 1.6 times (in comparison with a 2.8-time increase in 1989), and in Kirghizstan and Tajikistan by 2 percent and 4 percent; viral hepatitis increased in Kazakhstan, Azerbaijan and Latvia by 1.3 times, in Belarus by 1.5 times and in Armenia by 1.6 times. In 1990 the incidence of *Salmonella* infections grew in half of the republics. In this case the increases were by 1.3-1.8 times

in the Ukraine, Kazakhstan, Estonia and Belarus, 3-6 percent in Kirghizstan and 17 percent in Armenia.

Of the total number of cases of typhoid fever and paratyphoid (8,600 cases), 6,300 or 73 percent occurred in Uzbekistan, Tajikistan and Turkmenistan. In 1990, 1,435 persons suffered diphtheria (839 in 1989), to include 399 Moscow residents, of whom 26 died.

Low availability of water pipelines and sewage systems, shortcomings in the supply of quality drinking water to the population, pollution of the air, water sources and soil, and violation of public health and industrial regulations during the manufacture, storage and sale of foodstuffs remain the principal causes of the spread of infectious diseases.

Cases of infections in hospitals evoke special alarm. In 1990 over 30,000 purulent-septic infections were registered in the country's hospitals among children up to one month old and in 12,000 maternity hospitals; 27,000 postoperative infections (sepsis, abscesses), and 7,000 acute intestinal infections were registered as well.

The AIDS problem appeared in the country in 1986-1990. As of 1 July 1991 1,242 persons infected with human immunodeficiency virus (HIV) were registered, to include 652 Soviet citizens; the number of AIDS patients is 61, of whom 40 have died. One out of every two HIV-infected persons is a child up to 14 years old.

The availability of disposable medical instruments in public health institutions is not improving. In 1990 504.2 million disposable medical syringes were manufactured (the state order was 28 percent filled), which is 174 per 100 residents (67 in 1989). The manufacturing volume of such syringes in the first half of 1991 was only 18 percent of the state order.

The level of primary disability is not decreasing for practical purposes. In 1990 over 1 million persons were certified disabled, with half of them being workers. Of the total number certified as disabled for the first time, 444,000 or 74 percent are completely incapacitated (disability groups 1 and 2). The main causes of disability, as well as of mortality, are circulatory diseases—13.6, malignant neoplasms—9.0, and injuries—6.3 per 10,000 workers. The highest level of disability is noted in Estonia, the RSFSR, Belarus and Lithuania—50-64 persons per 10,000 workers, as compared to a country average of 47.

High mortality persisted in the population in 1986-1990. Each year around 3 million persons died, or 10 persons per 1,000 population, to include 0.7 million of working age, with over half a million being men.

Change in mortality due to different causes is characterized by the following data:

Table 2.

	Number of Decedents Per 100,000 Population*		1990 as Percent of 1985
	1985	1990	
Deaths Due to All Causes	1,222	1,167	95
Including due to:			
Circulatory system diseases	705	632	90
Malignant neoplasms	174	188	109
Accidents, murders, suicides and other external effects	119.6	119.5	99.9
Respiratory diseases	104	75	72

\*Standardized indicators, with the effect of the population's age structure eliminated.

The main causes of mortality among men are diseases of the circulatory system and accidents, murders and suicides, which account for 60 percent of the decedents. Mortality among men of working age significantly exceeds mortality among women: by five times in relation to accidents, murders and suicides, and by three times in relation to circulatory and respiratory diseases.

Territorial differences are noted in the structure of the causes of death. Thus high mortality due to infectious and parasitic diseases and diseases of respiratory and digestive organs is typical of the Central Asian republics and Azerbaijan, while for the RSFSR, Latvia, Lithuania and Estonia, mortality is high due to accidents, murders and (except for Lithuania) neoplasms and circulatory system diseases.

In 1990, 168,000 children died, two-thirds of them up to one years old, or 22 persons per 1,000 births (26 in 1985). The level of infant mortality in the country is 2.2 to five times higher than in the USA, France, Great Britain, the FRG and Japan. The highest infant mortality is in the Central Asian republics (30-45 per 1,000 population), where the highest birth rate is noted concurrently, while minimum mortality is in Lithuania, Belarus and Estonia—10-12 per 1,000 population. Infant mortality due to different causes is characterized by the following:

Table 3.

	Number of Decedents Per 10,000 Births		1990 as percent of 1985
	1985	1990	
Deaths due to all causes	259.7	217.7	84
Including due to:			
States arising in the perinatal period	68.3	72.8	107



Table 3. (Continued)

	Number of Decedents Per 10,000 Births		1990 as per- cent of 1985
Respiratory organ diseases	92.3	61.9	67
Congenital abnormalities	33.2	31.3	94
Infectious and parasitic diseases	41.3	28.4	69
Diseases of the nervous system and sensory organs	4.3	3.6	84
Diseases of digestive organs	3.2	2.0	63

Calculations show that a decrease in infant mortality to the level attained in Lithuania, Belarus and Estonia would mean an increase in the expected life span by one year, and in republics with high infant mortality, two to three years.

A rise in expected life span was noted in 1985-1987 as a result of a decrease in mortality; however, this process subsequently came to a halt, and in 1988-1989 it stabilized at a level of 69.5 years. The present expected life span is 69.3 years, to include 64.3 years for men and 73.9 years for women, and it remains lower than in the FRG, France, Great Britain, the USA and Japan—by eight to 12 years for men and by four to seven years for women. The expected life span is noted to be lower than the country average in Turkmenistan, Moldova, Kirghizstan and Kazakhstan—66.4-68.8 years.

Protection of the health of the mother and child remained an acute social problem in the last five-year period.

The health of newborn infants depended in many ways on the health of the mother. In 1990 255,000, or 5 percent, of infants born in hospitals of the USSR Ministry of Health were born prematurely, while 6 percent were born prematurely in Kazakhstan, Armenia and Tajikistan. One hundred thirty-nine out of every thousand infants were born ill, or they fell ill (91 in 1985); in this case three times more did so among premature infants. An even larger mortality gap exists between infants born prematurely and at term—correspondingly 87 and 3.3 decedents per 1,000 births. According to data of the USSR Ministry of Health each year approximately 60,000 children are born in the country with congenital and hereditary diseases; by as early as preschool age, 15-20 percent of children have chronic diseases, and by the end of school up to 60 percent of adolescents find their job choice limited for reason of health. Each year 40 million cases of respiratory diseases (two-thirds) are recorded among children up to 15 years old, more than 130,000 children are discovered to have mental disorders, over 7,000 are found to have active tuberculosis, and around 4 million children, or 5 percent of the total

number, suffer injuries. Moreover thousands of children fall ill with various infectious diseases.

The main causes of deteriorating health of women, of growth in the number of premature births, and of growth of infant morbidity are the unfavorable living and working conditions of women, growth of the effect of ecologically harmful factors, as well as a large number of pregnancies, short intervals between births, pregnancy in very young and old mothers, frequent abortions and serious shortcomings in the organization of health care for women and children.

As compared to 1985, in 1990 the availability of physicians and secondary medical personnel increased by 5 and 4 percent in almost all republics, the availability of hospitals increased by 2 percent, and the availability of outpatient hospitals and polyclinics increased by 10 percent. In this case the rate of growth of the availability of medical personnel and hospital beds was almost twice lower than in the preceding five-year plan. Today the availability of secondary medical personnel per 10,000 population is 23 percent lower and availability of polyclinics is 21 percent lower than the standard, while the availability of hospitals is 5 percent lower. Differences still exist in the level of health care provided in different regions of the country: The availability of physicians and polyclinic care to the population of the Baltic countries and Georgia is twice greater than in the Central Asian republics, and the availability of hospital beds is 1.5 times higher in Latvia and the RSFSR than in the Transcaucasian republics. The number of specialized beds continues to be insufficient: The availability of beds for ophthalmological and otolaryngological patients remains significantly short of the standard—by 47-53 percent, while the availability of beds for neurological, oncological and mental patients is 19-33 percent short of the standard. The availability of beds to tuberculosis and dermato-venerological patients is 19 and 28 percent short of the standard, with their number decreasing in the last five years—by 11 percent and 7 percent.

Hospitals with a total capacity of 336,800 beds were placed into operation on the basis of all sources of financing in 1986-1990. This was 6 percent more than in 1981-1985. Outpatient and polyclinic institutions with a capacity of 945,200 visits per shift were introduced, which was 33 percent more. Such growth is the result of the significant scale of construction in the first two years of the five-year period.

Because of a decrease in the rate of construction of public health facilities initiated in the second half of 1988, the levels of fulfillment of five-year plan assignments were 89 percent for introduction of hospitals and 99 percent for polyclinics. Two hundred four hospitals with a capacity of 200 beds each and 27 polyclinics with a capacity of 480 visits per shift were not placed into operation on time in the five-year plan.

Introduction of public health facilities continued to decrease in 1990. As compared to 1989, 28 percent fewer hospitals and 15 percent fewer polyclinics were built. Expressed per 10,000 population, in the last year of the five-year plan the hospital capacity that was introduced was 1.6 beds as compared to 2.6 in 1986, while the polyclinic capacities introduced were 5.5 visits per shift, as compared to 6.3.

As in previous years, many therapeutic and preventive institutions lack improvements, and many of them do not have the elementary conveniences. According to a survey of 11,000 institutions, 9 percent of polyclinics and 15 percent of hospital buildings lack water pipelines, correspondingly 15 percent and 24 percent lack sewage systems, 12 percent and 19 percent lack central heating, and 29 percent and 49 percent lack hot water supply; there are no baths (showers) or ventilation and air conditioning systems in approximately half of the buildings. The level of improvement of section hospitals is especially low: Half of them lack sewage systems, while 80 percent lack hot water supply.

According to the results of a survey of over 50,000 persons, half of the population is dissatisfied or not fully satisfied with the quality of health care services. The main causes of dissatisfaction were: The low qualifications of medical personnel, an inattentive attitude toward patients, poor diet, absence of the needed drugs, the unsatisfactory sanitary and hygienic conditions of wards and public places, and lack of improvements.

An extremely stressful situation evolved in recent years in the supply of drugs and medical articles to the population and therapeutic institutions. The demand of public health for them is regularly not being satisfied: In 1990 orders were 70 percent filled by Soviet production and imported purchases, orders were 86 percent satisfied in 1989, and they were 78 percent satisfied in 1988. Only a third of the orders were satisfied by Soviet industry (52 percent in 1985). Orders for blood substitutes and plasma-substituting solutions are being filled by only a fourth, orders for antiseptics, antituberculosis drugs, drugs for local and general anesthesia and vitamins are being filled by a little more than half, and orders for psychotropic and antihistamine drugs, antibiotics, fever reducing and anti-inflammatory drugs, hormones, enzymes, cardiovascular, spasmolytic and diagnostic agents, dressing materials, and bacterial and viral preparations are being filled by two-thirds. In connection with this, criminal trade in medicines is now encountered throughout practically the entire country. Speculative prices of drugs exceed state prices by an average of 19 times. The cost of a number of drugs reaches up to R300-500 per package on the black market.

The increase in production of certain types of drugs attained in the years of the past five-year plan was insignificant. This was responsible to a significant degree for the drug shortage that evolved in 1989 and grew acute in 1990. In particular the increase in production of salicylic and organotherapeutic drugs was only 4 percent,

and the increase in vitamins intended for medical purposes was 9 percent; in this case vitamin A production decreased by 7 percent, while vitamin B<sub>2</sub> production decreased by 43 percent. Production of sulfanilamide derivatives decreased by 10 percent, while production of antibiotics such as levomycetin decreased by 19 percent and production of streptomycin sulfate decreased by 35 percent. Because of the absence of raw materials, practically no analgin tablets were produced in early 1990, and the manufacture of individual types of cardiovascular drugs and fever reducing and painkilling agents was in danger of termination. The difficult drug situation has spilled over into this year as well. In the first half of this year, medical industry enterprises decreased production of salicylic drugs by 9 percent, sulfanilamide derivatives and drugs used to treat eye diseases by 28 percent, and drugs for the treatment of sugar diabetes by 47 percent. The quantity of drugs used to treat cardiovascular diseases was 86 million vials and 20 million packages less than in the first half of last year, while the quantity of painkilling, fever reducing and anti-inflammatory agents was 9 million vials and 54 million packages less than last year.

Satisfying the demand of public health institutions for medical equipment continues to be difficult. In 1990 Soviet industry satisfied only 46 percent of the orders for medical equipment, while with regard for imported purchases the orders were 55-56 percent satisfied.

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#### **Belorussian People's Deputies Discuss Chernobyl Effects**

927C0255A Minsk SOVETSKAYA BELORUSSIYA  
in Russian 9 Jan 92 p 2

[Article by A. Chernyavskaya: "Health Care Through the Prism of the Laws: Roundtable Discussion"]

[Text] The author collective writing on medical subjects met with deputies of the Supreme Soviet of the Republic of Belarus in the editor's office of SOVETSKAYA BELORUSSIYA. This was a discussion between journalists and medical specialists because both the authors of our articles and the legislators were practicing physicians. Many issues were discussed, but the subject receiving the most attention was the impression people's deputies have of our medicine in connection with the new public health laws currently being drafted by parliamentary commissions. The problems of Chernobyl were addressed as well.

People's Deputy L. A. Zverev, a radiologist from Mogilev, feels that transforming our public health system, which has been described as impoverished, as being funded on the basis of the residual principle, and as being universally accessible, into a proper system would be impossible without fundamental transformations in the social status of the physician, which can be changed

only by introducing an insured health care system. "Insured health care will finally relieve our patient of what we have referred to as concern for the individual, seeing that the individual has tired of such concern. It is time to give him the possibility for caring for himself, and this is only possible in a system in which it is advantageous to be healthy."

This idea was developed further in a statement by People's Deputy A. V. Parul, a surgeon from Polotsk. "The laws are ineffective and they cannot be effective because these are selective laws. We need to treat the entire organism—not individual organs; as long as our Supreme Soviet is unable to determine the road it is taking, our laws will not work. Yes, our future lies in insured health care, but a law on insured health care will not operate apart from an entire complex of socioeconomic laws. Today, an enterprise transfers 37 percent of its deductions into the state budget, and after that, no one can explain what benevolent purposes this money goes to. Today an enterprise benefits when a worker is sick: It does not have to pay for the hospital pass, and there is no shortage of manpower, because quite often there is no work to do at the enterprise. We need insurance companies. We need to give workers not 30 percent of their earnings but possibly 60-70 so that they could personally pay insurance premiums. Until we develop an economical approach to health care, until we understand that health care is not a bothersome burden but a sector of the economy that makes and saves money, nothing will change."

Nor could the fate of rayons plagued with radioactivity be avoided in the discussion. People's Deputy V. S. Vorobey, director of the Gomel Oblast Health Department, gave his impressions of a trip through the radioactive zone. The therapeutic institutions are dilapidated. At the hospital in Bragin, which has a capacity of 400 beds, the same soup is made for everyone, such that there could be no discussion of special diets. Meat and vegetables are unavailable. Children have not received either juice or lettuce for a year because the rayon is not receiving the foodstuffs it needs. The situation with medicines, instruments, and equipment is the same as in the entire republic.

One special concern, one special headache of the deputy, is the emptying of the villages. Those who are healthy and able to adapt to a new life have moved away. The weak and incapable, who cannot and, most importantly, do not want to leave, have remained. They have been left for practical purposes without health care. Moreover, in order to force them to move, local authorities deprive them of communication with the world, cutting their lights and telephone. Such that the stubborn, unfortunate old people have been left without social assistance.

There is one other question: What is to become of young medical institute graduates who are to live long, treat many, and most importantly, bear children? Are they to be doomed to a monstrous risk?

M. P. Kisilev, deputy chief physician for medical determination of disability at Clinical Hospital No. 1, feels that hospitals need to be organized in clean rayons and that contaminated zones need to be provided with all communication resources, bringing them closer to medical institutions at least in this fashion. The authorities found another solution: They sharply increased the wages of medical personnel in rayons with elevated radiation. Now a physician working there can receive up to R2,500 per month. Well, it is fully possible that middle-aged and elderly people will want to insure a pension and trouble-free old age. For now, though, there are not many takers.

The Chernobyl zone is now a study area. New scientific research institutes are forming, and foreign scientists are traveling there. This is understandable: The case is unique, and the whole world's scientific community cannot remain indifferent. But in the opinion of E. I. Zborovskiy, director of the Institute of Disability Certification and Organization of Labor for the Disabled, and the republic's chief psychotherapist V. T. Kondrashenko, the focus of the research is rather narrow: Reactions of the blood and of the immune and hormone systems are being studied, and their dynamics are being predicted. "At the same time," Professor Zborovskiy noted, "the sharp increase in frequency of heart disease, hypertension and hypodynamia, which had never been encountered previously for example in Narovlyanskiy Rayon, remain without adequate attention; now that the people have been deprived of the possibility for maintaining livestock and they spend all of their free time in front of the television set, they have gained a significant amount of weight, which carries the danger of cardiovascular diseases in the future. Under the conditions of tomorrow's market economy," the professor feels, "not only the disabled, but also retired persons will be left out in the cold. Sick people whom we do not certify as disabled for economic reasons will remain without jobs."

The scientist feels that we cannot concern ourselves with the individual in parts: blood separately from the heart and separately from the right kidney. There are things that are no less dangerous than long exposure to small doses of radiation—an abrupt change in the living routine and in the way of life. A person, after all, is also a brain and a psyche. We need social programs directed at helping the individual's soul.

Professor V. T. Kondrashenko, a specialist "of human souls," could not help responding to this postulate. Research conducted in contaminated zones showed that inhabitants of these rayons suffer nervous and mental disorders in more than 90 percent of the cases, and in the country as a whole the number of psychoneural disorders has increased. Approximately 10 percent of the population of the former Union suffers from them today. At the same time, if we are to believe our data an abrupt decline of this disease group occurred in Belorussia in the last five years: just 0.5 percent of the population, which is nowhere near the actual level. The drop in neurotic patients is especially dramatic. Most likely people are

simply afraid to go to psychiatrists, preferring to see therapists, neuropathologists, and any other specialists with a wide profile; while seeing a psychotherapist and receiving treatment from him is the daily norm of life abroad, our hospitals lack this form of care due to ignorance and due to the impermissibly small number of psychotherapists. For practical purposes the republic has no psychotherapeutic service.

The problems are serious and vitally important to every inhabitant of Belarus. Solution of many of them depends on the lawmakers.

### New Private Medical Center

927C0255B Moscow NEZAVISIMAYA GAZETA  
in Russian 10 Jan 92 p 6

[Article by Andrey Bayduzhiy: "Physicians Believe Strokes Are Becoming an Urban Disease: One More Private Medical Center May Soon Appear in Moscow"]

[Text] Doctors are sounding the alarm. In their opinion a much greater danger has been overlooked in the struggle against cancer and AIDS—an increase in the incidence of strokes. Each year strokes take more lives than both of these diseases taken together. Just in Moscow alone, the economic loss from and the expenditures on treatment of strokes exceed a billion rubles.

The situation has recently grown especially acute. In 1990, 50,000 persons were hospitalized with a stroke in Moscow. The disease is acquiring ever-clearer signs of an epidemic. The number of patients is increasing every year by 3,000.

We can no longer wait. We need immediate steps. There are already 80,000 persons in the capital disabled by stroke. Each year they are joined by another 16,000. They are paid R50 million just in disability benefits.

Disability due to stroke could be reduced significantly if Moscow had an integrated system for treating and rehabilitating persons suffering a stroke. Patients now undergo rehabilitation in ordinary polyclinics not adapted for this purpose. Registered in Moscow in October, the Anti-Stroke Association made it its goal to create a unified center for the treatment of stroke. Its founders include leading Moscow neurologists and representatives of the Moscow Medical Academy, the Russian Medical University and the Institute imeni Semashko.

In the opinion of the board of the Anti-Stroke Association the center will be totally independent of state structures. Treatment will be provided, as foreseen by the law on health care insurance, on the basis of contracts with enterprises and individuals. Part of the profit from its activities is to be paid to the state public health system.

The plans of the association include publishing medical literature, developing scientific programs and training

medical personnel. Not a single medical school is currently training rehabilitation specialists, and this specialty is not even on the list of occupations.

Developed countries have an entire industry providing services to persons suffering stroke. It produces everything from special dishware and toys to sports trainers. We can only dream of such "luxury" here. There is a shortage of the most necessary drugs. A package of cerebrolysin costs R250 on the black market.

Creation of the center requires several tens of millions of rubles. Vice Mayor Yu. Luzhkov promised his assistance in organizing it. However, according to some opinions only the Moscow Interbank Union can allocate such a sum. Businessmen are thinking about it. And in the meantime the Composers' Union has planned a benefit concert in the very near future, with the proceeds going to a fund for the center's creation.

### Russian Measures To Improve Drug Supplies

927C0263A Moscow ROSSIYSKAYA GAZETA  
in Russian 5 Feb 92 p 3

[Article by Andrey Gusev: "No Better Off: Russian Public Health After Seven Decades of Work Under Soviet Power"]

[Text] The proportion of the gross national product going to protection of the people's health was approximately 3 percent in the former USSR. Is this a large amount or is it a little compared with all European countries, where it reaches 6-8 percent?

The drug production volume per inhabitant was around 14 rubles per year, which is 8-10 times lower than in developed capitalist countries (data are from the USSR Committee for People's Control).

Public health's demand for drugs was satisfied by Soviet industry by 52 percent in 1985, by 47 percent in 1989 and by 39 percent in 1990 (from a report from Soyuzfarmatsiya).

So what do we have? Soviet industry is satisfying approximately half of the demand of public health for medicines. In this case the production volume is almost 10 times lower than in the West. The following question begs itself: Why are the needs of our patients estimated at a level five times lower? Does this mean that Soviet patients in Soviet hospitals are five times more viable than their Western fellows in misfortune?

Russian pharmaceutical industry was kept in the background for many years. The main focus was on importing drugs and developing pharmaceutical industry in former CEMA countries, into which five times more assets were invested in the last 15 years than into Soviet industry. During this time not a single new pharmaceutical plant was built in Russia, and wear of fixed productive capital reached 70-90 percent in operating plants.

Medical equipment is also in the same sorry state. Annual output of laboratory diagnostic equipment did not exceed R30 million in the USSR. In the U.S. it was estimated at approximately \$1.5 billion in that same period. The output volume of flexible and rigid endoscopes was estimated at a total of R33 million per year in the USSR. In the U.S. it was almost R350 million. In value terms, there is approximately 3,000 times less ultrasonic diagnostic equipment in our country than in the U.S.

But what about the fact that the former USSR had the most physicians in the world—one physician for every 307 persons in the population? But when there are not enough hospitals and polyclinics, and equipment and medicines are lacking, what can a physician do? "No assets!" This verdict is almost like a death sentence to tens of thousands of Russian patients.

The Russian government is now implementing emergency measures in order to deal with the medicinal crisis that has struck the country. The corresponding government decree was published, in accordance with which 1,350,000,000 rubles in hard currency are to be allocated for the purchase of imported medicines in 1992. Beginning in 1992 not less than 10 percent of the volume of foreign credit will be channeled into acquisition of drugs, raw materials and equipment for pharmaceutical industry. A complex of measures to develop local pharmaceutical industry is foreseen. In particular, a decision was made to build a pharmaceutical plant with an output capacity of 150 tons per year in the city of Kstovo, Nizhegorod Oblast, in 1992-1994. There are plans to attract foreign companies to participate in this project, one of the requirements of which is that construction must be completely finished prior to acceptance. Construction of pharmaceutical plants is also planned in Novokuznetsk, Tomsk and Moscow Oblast.

Mention should also be made of a Russian state program for improving medicinal support and development of pharmaceutical industry in 1992-1995. The program foresees transition to market relations in the production and sales of drugs. There are plans in this case to lengthen the list of medical indications on the basis of which drugs are dispensed to patients free of charge, and to introduce free medicinal support (on the basis of doctors' prescriptions) to unemployed retired persons and children up to 14 years old.

When it comes to long-range programs, Russia has already adopted the Law on Health Care Insurance for Citizens. Measures are now being implemented to put it into effect. However, in the opinion of a number of experts there are many imperfections in the adopted law. In particular, it raises no barriers to dictatorship by insurance companies and medical institutions. Before, the assortment of services patients received was minimal of course, but it was free of charge; now they will have to pay for the same volume of health care, and although the payments will be made primarily by enterprises and organizations, the essence of this changes little.

Independent experts feel that the Russian Ministry of Health has created a haven for itself from all sides by the new law. The department was able to increase its income by three or four times by pumping money out of enterprises and the population (assets need to be attracted, after all, and not confiscated!). In this case it is keeping these assets completely under its control. While in former times there was at least some sort of control on the part of party organs over the public health system (even though it was not legally based), now control is essentially not foreseen.

Today's Russia lacks the institution of private physicians. Medical cooperatives do not count—they only provide a small list of services. The corresponding decrees prohibit them from treating infectious and oncological diseases, from performing surgery and so on. In general, the list of forbidden forms of activity is rather impressive. Thus patients have practically no choice as to where they can go—only to state medical institutions; everything will depend on what sort of insurance the patient will have.

If he opts for ultra-expensive insurance, he will have access to the clinic of the former Fourth Directorate. If he opts for the less expensive version, he will have to go to the hospital, where overcrowding requires patients to lie in the hallways. The latter will probably be the fate of the majority, including those of average means. Given the monopoly on medical services, insured health care will hardly change anything fundamentally.

Professor Yuriy Vorontsov, vice president of the Union of United Cooperators, emphasizes: The weakness of insured health care lies in the fact that the hospitals are interested in raising the prices of their services, while insurance companies are interested in increasing the number of policies, which is why the institution of private physicians was looked to as the solution in the West.

We will probably travel the same path as normal civilized society, and in the area of public health as well. Before we can go farther, we will first have to have insured health care. Only it would be very nice if it had a human face and hardly a face strongly resembling the profile of the former health care providers of the former USSR.

### Drug Price Increases Threaten Medical Cooperatives

927C0263B Moscow PRAVDA in Russian 14 Jan 92 p 1

[Article by Valentina Proskurina: "What Health Care Costs Today"]

[Text] Medical cooperatives first appeared in our country three years ago. Advertisements began appearing in the newspapers: Miloserdnye, Diktor and Eskulap invited us to go to them for treatment. The attitude toward them varied: Some said that they made it convenient for the rich and that they provided physicians with a possibility of

**raking in piles of money. Then why is it that medical personnel have recently been the ones to warn us of possible strikes?**

I asked Candidate of Medical Sciences L. G. Podolskiy, chairman of Moscow's Doktor cooperative, whether he had "raked in" a lot of money. He laughed in response:

"Has anybody asked why many medical cooperatives have closed? It is probably not due to the good life. As a rule we do not own our own buildings—we lease everything for large amounts, and the contracts are signed for but a short time. At any moment the building owner could show you the door. Where is medical equipment to be had, particularly with prices growing so drastically? We are taxed as if we are speculators with access to commercial coffers; as a result, the wages of our personnel are not much higher than the official level. But our physicians have become accustomed to a modest livelihood—they are happy just for this possibility for earning a living."

What awaits medical cooperatives on the backdrop of the liberalization of prices? Because they do not own their own buildings, and they are unable to purchase medical equipment and drugs, they will unavoidably find themselves at the brink of extinction, as was the case for example in Nizhniy Novgorod. Cost-accounting health care began to be developed there on the basis of public facilities as a counterweight to cooperatives. Relatively low fees, use of medical equipment from centralized sources, and long-established collectives of medical personnel attract patients. This road was also taken by the fabulously equipped oblast hospital, staffed by the strongest possible personnel. Treatment there is paid for as a rule by the enterprises in which the patients work.

Medical cooperatives are obviously a transitional form between free and universally accessible state health care and private, privileged care, which will be available only to people with fat wallets.

Well, if rich people have now made their appearance in our society, and restaurants, bars, saunas and casinos have been opened for them, why can we not have hospital wards with color television sets and carpeting, with fancy table settings and fantastic menus, and with professors who enter the wards respectfully? It is no secret that such wards already exist in some of our hospitals and institute clinics, and we will never stray from this again. But....

It is immoral to forget about health care for the poor. Let it be without carpeting and crystal glassware, without television sets and gourmet menus, but with the same apparatus, with the same drugs, with professors and physicians receiving the same wages.

Privatization in health care is being discussed only in whispers, while paid health care is discussed at full volume, but if each person is to be able to use paid health care, he must have the assets for this. Might it not be

time to stop putting the part of wages taken away from us for public health and social insurance into the common pot?

Why not open a special account for each worker? Then treatment and hospital passes could be paid for out of money accumulated in it, and each person could select the clinic of his choice on the basis of his financial possibilities. Another injustice would eliminate itself as well: hospital passes obtained through acquaintances and as gifts. Under the new conditions no one would hardly want to apply for a hospital pass due to a cold, and people will begin taking better care of their health, knowing that it costs a great deal of money, all the more so because the money an individual saves would come back to him upon retirement.

It stands to reason that public health for children, retired persons, the disabled and the poor should be paid for by the state, but if the state does not have enough money to do so, the rich should help—not with handouts, but, for example, through a higher tax for using hospitals offering better comforts.

The transition to insured and paid health care is only just beginning. It is still not too late to anticipate the submerged reefs along this course.

### **Hospitals Lack Basic Supplies, Equipment**

927C0263C Moscow SOVETSKAYA ROSSIYA  
in Russian 5 Feb 92 p 2

[Article by correspondent P. Orlov: "Going to the Hospital With Your Own Syringe: On Public Health That Has Ceased To Be Public"]

[Text] Today, it is not enough to be sick to get a bed in the hospital. It would be desirable to acquire a referral from a plant or an office that has signed a contract with the therapeutic institution regarding treatment of its associates, and to it you should append syringes, other instruments, and medicines necessary for recovery. Without this, there is a great risk of being turned away at the door: "There are no free beds, come back in a month." Does every sick person have enough health to wait for the cure?

In terms of the number of beds in therapeutic institutions, and in terms of the number of physicians, Russia gives the impression of being the most developed state in the world, but you would hardly find a country in which such a sizable number of citizens depart for the other world prematurely because of the absence of prompt and qualified care. In terms of average life span, we compare with states of the Dark Continent. Our public health is falling ever shorter of not only world standards, but also common sense.

Not long ago they forgot to lock the operating room in Nizhniy Novgorod's center for cardiac surgery. When they suddenly realized the mistake, all of the surgical instruments were already gone. Under today's conditions it was a major, irreplaceable loss.

"Our surgeons do not throw their dull razor blades away after shaving," explained medical academician, Hero of Socialist Labor Boris Alekseyevich Korolev. "They insert them into hemostats and operate with this 'instrument,' instead of a scalpel."

In his words, the academician had never seen such a catastrophe in supplying therapeutic institutions before, even though it was 60 years ago that he first took his place at the operating table.

At this most famous center for cardiac surgery, for example, operations were postponed for two weeks due to the absence of rubber gloves. Immunodeficiency virus also struck other therapeutic institutions of Nizhniy Novgorod creating a situation in which you might as well just close the hospitals down. What could you possibly require a surgeon to do without those extensions of his hands—scalpels, clamps, scissors, hooks? Without cotton, iodine, Perhydrol, hydrogen peroxide?

Not that long ago, someone would have given the order: "So get the Medtekhnika Association to make a delivery," but orders are no longer honorable; the association has itself been reorganized: Now it is a marketing and supply company. What help can you get from it if the former system of interaction with equipment producers and with medical institutions was simultaneously "reorganized" with nothing better created in its place? Out of 320 required contracts, it was able to sign only 20 this year.

Instead of studying the demand of the hospitals and delivering and justly distributing equipment received from centralized sources, the company is forced to devote all of its energy and resources to commerce. If you want boron and suture needles from the plant in Kazan, give it tubing, rolled metal and cardboard in exchange. If you need anesthesiological apparatus, ferry an automobile over to St. Petersburg.

It would seem that market relations would allow therapeutic institutions to do without a middleman and that they even encourage them to establish direct ties with producers. There are favorable conditions for this in Nizhegorod Oblast. Two of the country's largest medical instrument plants are located here, in Vorsma and Tumbotino. Without these articles, as they say, there will be no cutting, no suturing. You would think that they would not abandon their fellow countrymen in distress: They would help them out without barter, for rubles.

"We are not ready for such a market or for the reforms the government is implementing," Mikhail Ivanovich Detyarev, chief engineer of the Vorsma plant, made himself absolutely clear. "First of all the danger of being left without materials is so great that production may come to a halt. Second, we are frightened by the unpredictable growth of raw material prices. Because of this, the enterprise may find itself bankrupt; add to this the fact that the demand for our products is still unknown: We can only make guesses as to which of 600 different articles we should produce, and how many."

There are price controls on medical instruments. The plant does not have the right to raise prices on them by more than four times, but when it comes to the prices of materials, there is nothing to keep them from climbing. The plant purchased some brass at a price 55 times higher than last year, and now it has found itself without even a kopeck. In such a situation it should ask a ruble and a half for a three kopeck needle. But who is going to pay that?

A speculator, of course, will not go broke (the demand in the black market for medical instruments is unlimited. In Poland, 10 scalpels go for a pair of jeans), but a hospital is different. Messengers from the hospitals are already coming to strongly resemble customers in a store: There are things they need to buy, but nothing to buy them with. Plant managers feel sorry for them, and advise them to find a sponsor or to bring goods and food products in exchange. A tempting proposal, but there are few deals to be made. You yourself know that hospitals do not engage in logging, they do not make reinforced concrete, and they did not have the foresight to start up smelting furnaces. They made absolutely no preparations for the market economy!

In the past, in such cases doctors went begging to directors of neighboring plants, and the latter paid the bills, transferring the debt to their own enterprises. But now they are all counting every kopeck, and they no longer have the means to be charitable; in the meantime the people continue to fall ill—even more frequently at that, and wait for help by pre-market habit.

Sell bed space, of all things: That was the solution our medical workers came up with. They began offering space in the hospital year-round to the strong of this world for 10,000-50,000 rubles with the guarantee of accommodating the "contracting patient" at his first application and with the promise to care for him like one's own mother. Wards for the privileged appeared in the hospitals: Their walls are not as gray as in neighboring wards, the sheets have not been washed to shreds, and the television set shows programs in color. Together with such barter, division of patients into "white" and "black," something we remember from not that long ago, has come to the hospitals (or more accurately, it has returned).

The ordinary patients are of course bursting with indignation: "Now look at that, entrepreneurs in white smocks! They vowed to be humane toward all who suffer, but now they are providing treatment selectively. One consults with a professor, while I am thrown to the mercy of a practitioner. Is it my fault that my plant does not have the means to buy an insider's bed?" And he is right, this ordinary person is a mortal, and everyone wants to live: the worker of a profit-making enterprise as well as the associate of a budget-supported institution, but with the way things are divided up, their chances are unfortunately different. What sort of social justice is this! Obviously, we are all equal only in the cemetery.



On the other hand, how can we not understand the physicians? Miserly allocations from the budget barely provide the hospital with its lowest "subsistence minimum." Its equipment is nowhere near a modern level. Just buying a thermometer is a problem: Its price was raised from 30 kopecks to four rubles 30 kopecks.

Who will take it upon himself to resolve this conflict between the patient and the resourceful doctor? Both of them are facing poverty. Both are stepchildren of their own state, and victims of ambitious experiments with the people's lives. Neither will live man's average life span in good health. If we are going to condemn anyone, then we should condemn the direct culprits of the tragedy, those who have not experienced the discomfort of a hospital bed with sagging springs, who are still unaware of the savageness of the procedures carried on with apparatus written off long ago, and who enjoy the use of not only disposable syringes, but also medicines the people have never heard of. They all have come to power, and still do so, on the basis of promises to dramatically improve the quality of public health and to significantly increase deductions from the budget to preserve the lives of their constituents, but once they find themselves in their high-backed chairs, they allocate more money to the maintenance of their own selves and their bureaucracies than to protecting the health of the people, and they set wages for surgeons that are lower than those of a "democratic" secretary.

Once you know that doctors are using old razor blades instead of scalpels, the question that joking doctor posed to his associates no longer seems at all funny: "Are we going to treat the patient, or should we let him live?" What was once a joke is now a reflection of our reality that is closer to the truth.

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### Study of Need for Cardiological Drugs in Treatment-Prevention Facilities of Uzbek SSR

927C0291D Tashkent MEDITSINSKIY ZHURNAL  
UZBEKISTANA in Russian No 10, Oct 91 (manuscript received 22 Jan 91) pp 45-47

[Article by R. Sh. Mamutov, R. Z. Ziyayev, and Sh. Z. Umarova Scientific Research Institute of Cardiology, UzSSR Ministry of Health; Tashkent Pharmaceutical Institute; UDC 615.22:614(575.1)]

[Abstract] A study of total of 1,256 medical histories and outpatient charts involving primarily arterial hypertension, ischemic heart disease, and combinations of the two conditions revealed that for outpatient, 39 preparations were prescribed 10 times or more; for hospitalized patients, 36 preparations were prescribed 10 times or more. A 2 percent solution of papaverin was prescribed most often (7.3 percent). Among the preparations used most often for hypertensive outpatients were, from most used to least used, adelfan, papaverin, raunatin, clofelin, panagin, ATH, dibasol, magnesium sulfate, intercardin, riboxin, and hipotiazid. The most often used drugs in the

hospitals were papaverin, vitamin B<sub>6</sub>, dibasol, nicotinic acid, clofelin, dimedrol, magnesium sulfate, panagin, adelfan, eufillin. In the polyclinics, 77 percent of the patients were prescribed tablet forms, 23 percent, injectables. Those figures for hospitals were 56.6 percent and 43.4 percent. Some 88.5 percent of hospitalized arterial hypertension patients received a 5 percent solution of vitamin B<sub>6</sub>; 48.4 percent received a 1 percent solution of dibasol; 41.3 percent, a 25 percent solution of magnesium sulfate. In the polyclinics, 86.9 percent received adelfan; 83.9 percent, raunatin; 78.6 percent, a 0.5 percent solution of dibasol; 76.8 percent, a 1 percent ATH; and 71.1 percent, panagin. References 1: Uzbek.

### Falling Birth Rates, Rising Abortion Rates in Kazakhstan

927C0305A Alma-Ata AQ BOSAGHA in Kazakh  
24 Jan 92 p 2

[Interview with Sadwaqas Umbetalyuly Mustafayev, chief midwife/gynecologist of the Alma-Ata City Public Health Administration, director of the Alma-Ata Perinatalist Center, candidate in medical sciences, recorded by Gulzira Serghagiyeva: "If You Say: 'Let the People Grow, Let the New Generation Increase'"]

[Text] "If you say 'Let the people grow, let the new generation increase,' then social conditions as they now are must be brought under control quickly," said Sadwaqas Umbetalyuly Mustafayev, chief midwife/gynecologist of the Alma-Ata City Public Health Administration, director of the Alma-Ata Perinatalist Center, candidate in medical sciences.

[Serghagiyeva] We are having our first encounter with the facts of life of the market place with an attitude "the more the merrier," "a good start yields good results." As we do this, the number of difficult questions involved with solving the problem of rapid increase in prices have been expanded drastically, and as the threat to the livelihood of every family has gained ground a strange life has taken shape. It is impossible that this will not have a negative impact upon the proper development of the new generations of these families. Sadwaqas Umbetalyuly, is it true that as market problems have arisen birth rates have in fact been reduced sharply?

[Mustafayev] Indeed, we can say that all factors resulting in a falling, in a reduction of birth rates are due to the fact that the people fear the market place and are panicky. Price rises are going forward uninterrupted. Many families have been left half-destitute or starving. While inadequate salaries are enough to cloth and feed a person in some cases, in others they are not. In any case, everything, from the diapers of a new-born baby, the food of a child to shoes is very expensive. For this reason, do not look down on mothers who do not want more than one or two children. The state of all the women of today, each of them, is altogether unfortunate.

We note, for example, that according to the census taken at the end of 1990, there were 326,551 women of



child-bearing-age in Alma-Ata. By the end of year only 20,980 children had been born. But the results from 1991 indicate that 19,936 women gave birth. This information is from the capital only. However, it has been shown that for the republic as a whole the birth rate has continued to decrease since 1980. The growth rate of the people has fallen to 2 percent. There are those who regard this as a "quite normal circumstance of a time of transition to a free market." In my view, if this situation continues, in a few years, I am sad to say, I fear that we will be deprived of the regular growth rate of our people. It would seem as if our contemporaries, who have been floundering like a beached fish, have been presumptuous in saying "no matter what, babies are being born and the people will grow." Moreover, if the numbers of a people who form a vast sovereign and independent state and are looking to a hazy future are decreasing like this, it constitutes a great danger.

**[Serghaziyeva] As the number of children being born decrease, there are also other dangerous manifestations furiously appearing simultaneously. These dangerous manifestations are such things as induced miscarriages, abortions, and abandonment of children. Questions involved with limiting and controlling these things as much as possible must give you a great deal to think about as a medical specialist. What measures are you undertaking in this area.**

**[Mustafayev] It is true that large scale abortion is not on the decline. Whereas there were 23,752 medical abortions in Alma-Ata in 1990, the number of medical abortions performed during the first nine months of 1991 was 23,527, equal to the rate for an entire year. Some 13,000 of these were first conception abortions. This means that for every 1,000 children born, 1,500 innocents are choked with these barbaric and beastly**

means. What to do? To be sure, we must try, while rekindling the hopes of at least one of every three of those women who come before us ceaselessly and uninterruptedly, to get our point of view across. Fates are to be sure varied. Some complain: "I am raising the children that I have, I do not need another." Some say weeping: "I have no husband. I have no one to rely on. My situation is not good." They blame medical people saying: "You yourselves have opened your doors to abortion." To be sure, we cannot close the door. It is also true that the service has begun to be offered in a rational way. The reason why we cannot close the door is that there are a great many abortions carried out behind closed doors, secretly, without medicines or even simple hygiene, resulting in sorrow as a result of thoughtless action. Drugs are taken to induce miscarriages, poisoning the women and resulting in death. Medical abortions must be kept for such reasons. In America no dear payment is demanded for abortion, but one which anyone can pay. It even happens that, in addition to various things purchased in stores, literature on preventing pregnancy, the required equipment, and drugs is even available free. Likewise, simple methods for preventing conception and sanitary-hygienic education should be taught in a form appropriate to each age in school.

**[Serghaziyeva] If a people is not to become extinct, it requires growth. Somehow we must seek for ways to get out of the difficulties introduced by the market.**

**[Mustafayev] Indeed our state must show special concern for mothers, for pregnant women in particular. Likewise, there is nothing wrong for us to bear in mind that people have children as they grow up... On the contrary, should not our society create the appropriate conditions for them? In this connection I support the conclusions and ideas of our demographers.**

**Threshold Operator Characteristics in the Detection of a Brightness Signal Against a Background of Interference**

927C0291 Moscow PSIKHOLOGICHESKIY  
ZHURNAL in Russian Vol 12 No 4, Apr 91 pp 100-106

[Article by N. M. Novikova]

[Abstract] In studying the mental and physical characteristics of an operator detecting a signal on a PPI screen against a backdrop of interference, the researcher here found patterns in the distribution of the brightness threshold of sensitivity and decision-making time. Variation in brightness threshold was found to be due to variation in the sensor sensitivity of the operator. The

individual apparently develops a criterion for signal detection during training. Operator efficiency was evaluated with the equations  $\Delta B_{50 \text{ cpi}} / \Delta B_{50} = -0.4 + (0.054 \Delta B_{\text{cpi}} \tau_{\text{cpi}}) T_{\text{avg cpi}}^{1/5}$  and  $\Delta B_{50 \text{ cpi}} / \Delta B_{50} = 2 + (0.08 \Delta B_{\text{cpi}} \tau_{\text{cpi}}) / \sigma_{\text{cpi}} T_{\text{avg cpi}}^{1/5}$ , in which  $\Delta B_{50}$  is the brightness threshold of the operator without interference;  $\Delta B_{50 \text{ cpi}}$  is the threshold with interference;  $\Delta B_{\text{cpi}} = B_{\text{cpi}} - B_i$ ;  $B_{\text{cpi}}$  is the brightness of the chaotic pulsed interference;  $B_i$  is the brightness of the sweep trace;  $\tau_{\text{cpi}}$  is the duration of the cpi;  $T_{\text{avg cpi}}$  is the average interval between interference pulses; and  $\sigma_{\text{cpi}}$  is the rms deviation of the pattern of distribution of the amplitudes of the chaotic pulsed interference. The researcher developed an equation that links probability of signal detection, brightness threshold, and decision-making. Tables 2; references 10: Russian.

**Clinical and EKG Assessment of Chernobyl Cleanup Workers**

927C0219A Moscow MEDITSINSKAYA  
RADIOLOGIYA in Russian Vol 36 No 6, Jun 91  
(manuscript received 06 Aug 90) pp 25-27

[Article by N. A. Metlyayeva and N. M. Nadezhina, Institute of Biophysics, USSR Ministry of Health, Moscow; UDC 616.1-02:614.876]-07.616.12-073.97

[Abstract] Clinical and EKG studies were conducted on 107 males, 24-63 years old, engaged in Chernobyl cleanup, of whom 100 were employed in 1986 and 7 in 1987-1988. External whole-body IgG irradiation was in the  $< 50$  rem range. The key findings were that in workers  $\leq 39$  years old without a previous chronic disease the incidence (18.7 percent) of borderline hypertension was 1.3-fold higher than in an equivalent control cohort, while in workers with a history of a previous chronic disease the incidence (27.2 percent) was 1.9-fold greater. These differences were attributed to radiophobia and the stress involved in cleanup of radioactive fallout. Tables 1; references 5: 4 Russian, 1 Western.

**Incidence of Lethal Developmental Abnormalities in Area With Trace-Level Radiopollution**

927C0219B Moscow MEDITSINSKAYA  
RADIOLOGIYA in Russian Vol 36 No 6, Jun 91  
(manuscript received 30 Aug 90) pp 30-32

[Article by L. Yu. Krestinina, M. M. Kosenko and V. A. Kostyuchenko, Institute of Biophysics, USSR Ministry of Health, Moscow; UDC 616-001.28-02:614.73]-055.52-07:616-007.1-036.88-055.62

[Abstract] An analysis was conducted on the incidence of lethal developmental abnormalities (LDA) in an area in the Eastern Urals subjected to radioactive pollution in 1957 as a result of explosion at a radioactive waste storage facility. The study involved two populations: a cohort of 23,230 individuals in an area with 0.1-1 Ci/km<sup>2</sup> Sr-90  $\Gamma$  background radiation, and 10,270 persons in an area bearing a 1-4 Ci/km<sup>2</sup> burden. Statistical analysis for these groups and a control area in that region

showed that excess LDA for the former group was on the order of 0.02 cases per 23,230 persons and 0.04 cases per 10,270 in the latter group. These differences are statistically insignificant. Tables 2; references 3: Russian.

**Prevention of the Accumulation of Strontium-90 in the Skeleton by Enriching the Diet With Fish**

927C0291B Moscow VOPROSY PITANIYA in Russian  
No 2, Mar-Apr 91 (manuscript received 21 Nov 89)  
pp 40-42

[Article by V. A. Knizhnikov, V. A. Komleva, G. P. Novoselova, Z. I. Belova, N. D. Bobrovskaya, and I. G. Chanturiya, Institute of Biophysics, USSR Ministry of Health; All-Union Scientific Research Institute of Marine Fishing and Oceanography, USSR Ministry of the Fish Industry, Moscow; UDC 614.31:636.987:546.4202.90]-074+616,71-008.949.5:54642.02.90]-02:613281:546.4.02.90

[Abstract] The ever-present possibility of contamination from radioactive substances emanating from nuclear power plants and nuclear waste storage facilities prompted the researchers here to search for safe, inexpensive, long-term measures that can be used by a broad segment of the population to reduce the absorption of <sup>90</sup>Sr by bone tissue. In studying outbred white rats fed various diets (either calcium-rich or calcium-deficient), the researchers found that the skeletons of the rats fed calcium-deficient diets contained the highest levels of the isotope. Rats fed a calcium-deficient diet 20 percent of which, however, contained fish filet reduced the isotope level negligibly. When enough calcium carbonate was added to the diet to bring the calcium levels up by 30 mg/day, isotope levels dropped to a third of those in the first group. A fourth group was fed a diet that contained enough whole fish (as opposed to filet, but sans head and entrails) to provide some 80 mg calcium more a day than was ingested by group three; the diet produced results similar to those in the third group. A fifth group of rats ingested a diet identical to that of the fourth group but supplemented with 80 mg/day purified calcium carbonate. <sup>90</sup>Sr levels were lowest in that group. References 3: Russian.

**Effect of New Exopolysaccharide on the Animal Body**

927C0291C Moscow VOPROSY PITANIYA in Russian  
No 2, Mar-Apr 91 (manuscript received 30 May 89)  
pp 60-63

[Article by V. I. Smolyar, N. S. Saliy, S. N. Grigorenko, L. F. Gracheva, L. F. Lavrushenko, Ye. V. Tsapko, and M. M. Kolesnikov, Scientific Research Institute of Nutritional Hygiene, UkSSR Ministry of Health, Kiev; UDC 612.392.9:577.114].08

[Abstract] Owing to the increasing use of microbial exopolysaccharides in the food industry as stabilizers, thickening agents, foaming agents, moisture retainers, and suspending agents, the researchers here chose to study the effect of the exopolysaccharide PS 1—which is expected to be used in flour for improving dough properties—on the bodies of 200 outbred white rats over a period of 18 months. PS 1 is an acidic heteropolysaccharide with a molecular weight of between  $8 \times 10^5$  and  $2 \times$

$10^6$  daltons. It is synthesized by consolidating *Candida tropicalis* yeasts and *Pseudomonas* sp. bacteria on ethanol and contains glucose, mannose, galactose, and rhamnose in a molecular ration of 5:4:2:1, plus residues of pyrotartaric acid. Control animals and experimental animals were found to exhibit identical behavior and external appearance. Weight gains were similar. Antioxidant function of the liver was unaffected. Animals receiving a dose of PS 1 considered to be fivefold greater than normal evidenced elevated glucose levels after three months, but not after 10 or 18 months. Lipid metabolism remained unaffected, as did total serum protein content. Hemoglobin, erythrocytes, and leukocytes were unchanged. Gastrointestinal enzyme activity was normal at the 10- and 18-month marks. Oxidative phosphorylation was unaffected. A dose-dependent effect was observed between PS 1 and the number of small lymphocytes. The researchers concluded that the exopolysaccharide presents little danger in terms of its allergenic properties. References 14: 13 Russian, 1 Western.

**Detection of Cellular Receptor for Tick-Borne Encephalitis Virus (TBEV) by Antiidiotypic Antibodies Against Viral Protein E (VPE)**

927C0007A Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 315 No 1, Nov-Dec 90 (manuscript received 15 May 90) pp 226-228

[Article by A. V. Timofeyev, G. G. Karganova, D. G. Maldov, V. A. Lashkevich and L. B. Elbert, Institute of Poliomyelitis and Viral Encephalitides, USSR Academy of Medical Sciences, Moscow Oblast; UDC 576.809

[Abstract] Scatchard plots of the binding of <sup>3</sup>H-uridine labeled TBEV [tick-borne encephalitis virus] to a monolayer of embryonic pig kidney cells revealed the existence of high and low affinity cellular receptors. Trypsin treatment of the monolayer and introduction of murine antiidiotypic serum against VPE [viral protein E] abolished high affinity binding. In addition, the antiidiotypic antibodies were demonstrated to precipitate a 110 kD glycoprotein extracted from TBEV-uninfected cells. These observations were interpreted to implicate the 110 kD glycoprotein as a component of the high-affinity cellular receptor for TBEV. The nature of the low affinity receptor remains to be defined. Figures 2; references 10: 1 Russian, 9 Western.

**Blood Levels of Bioactive Factors and Vascular Permeability in Hemorrhagic Fever With Renal Syndrome (HFRS)**

927C0286D Moscow VOPROSY MEDITSINSKOY KHIMII in Russian Vol 37 No 5, Sep-Oct 91 (manuscript received 28 Dec 89) pp 70-73

[Article by Yu. L. Fedorenko, Khabarovsk Medical Institute; UDC 616.61-002.151-07:616.153/.154

[Abstract] Serum levels of serotonin, histamine, kallikrein and prekallikrein were monitored in relation to vascular permeability in 45 patients with HFRS (mostly men under 40). The results demonstrated marked increase in the levels of the factors involved, particularly in severe cases. The most pronounced elevations were seen in the case of kallikrein, exceeding 9.9-fold baseline values in the polyuric phase. Studies with I-131-labeled albumin showed a marked increase in vascular permeability. The correlation between enhanced vascular permeability and elevated kallikrein was particularly strong ( $r = 0.73$ ), and less so with serotonin ( $r = 0.61$ ) and histamine ( $r = 0.67$ ). Consequently, these findings implicate activation of the kallikrein-kinin system as underlying increased vascular permeability in HFRS. Tables 2; references 14: 13 Russian, 1 Western.

**Tyr-Gly-Gly-Phe-Met-Arg-Gly-Leu Octapeptide:  
Theoretical Conformational Analysis**

927C0286B Baku IZVESTIYA AKADEMII NAUK  
AZERBAYDZHANSKOY SSR: SERIYA  
BIOLOGICHESKIKH NAUK in Russian No 1,  
Jan-Feb 91 pp 110-113

[Article by N. A. Akhmedov and T. A. Makhmudova,  
Baku State University imeni S. M. Kirov; Radiation  
Research Section, Azerbaijan SSR Academy of Sciences;  
UDC 547.466;547.96

[Abstract] Theoretical conformation analysis was conducted on the octapeptide Tyr-Gly-Gly-Phe-Met-Arg-Gly-Leu, an analog of met-enkephalin, in order to identify potentially bioactive congeners. The study led to the identification of 14 low-energy conformations in the 0-6.6 kcal/mol interval attributed to six peptide skeleton shapes (efffeef, effffef, fffeeef, ffffeef, efffeef, ffeefeef). In the optimal conformations forces of attraction of ca. 6 kcal/mol prevail between the N-terminal Tyr<sup>1</sup>—Met<sup>5</sup> fragment and the C-terminal Arg<sup>5</sup>—Leu<sup>8</sup> tripeptide. Tables 1; references 11: 8 Russian, 3 Western.

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